THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXIII. No. 1868.] LONDON, FEBRUARY 28, 1899. [51ST YEAR. PRICE 6d.

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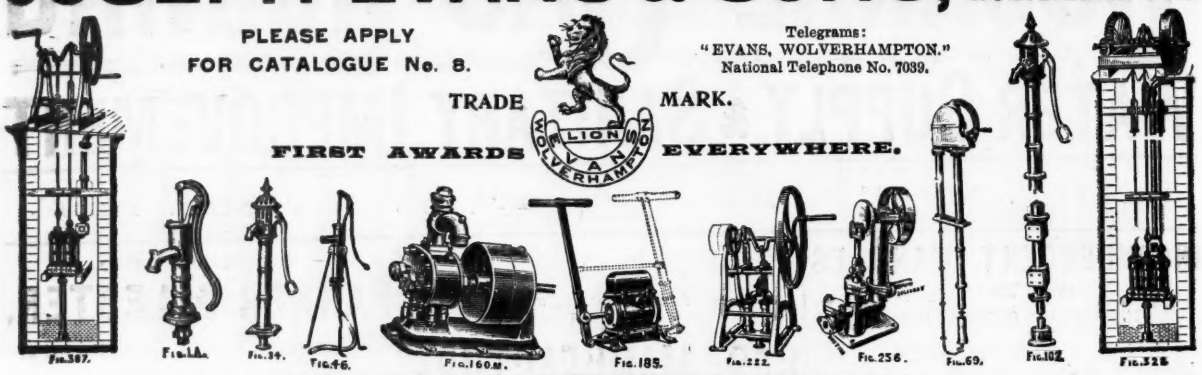

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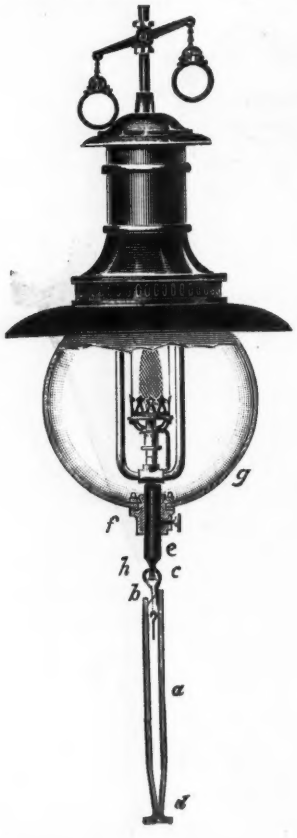

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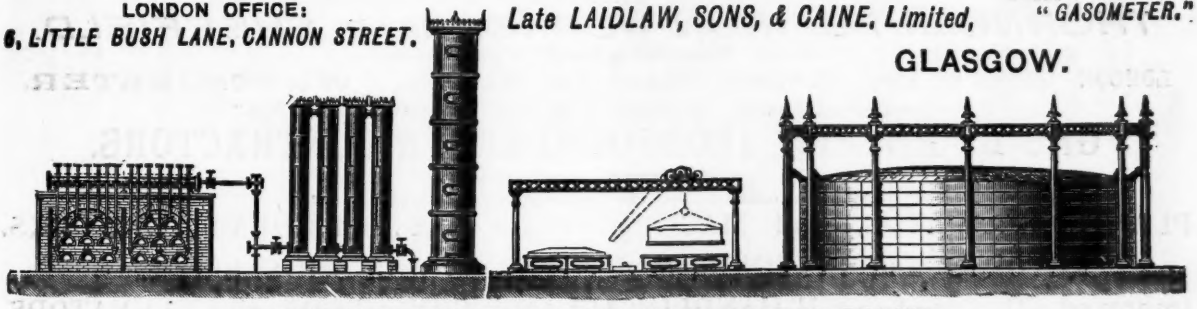

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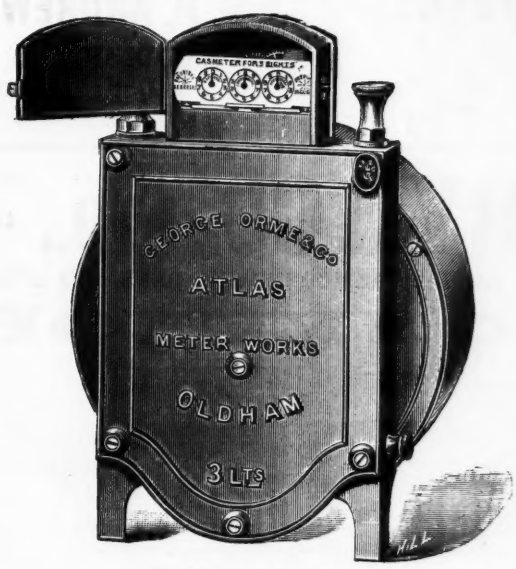

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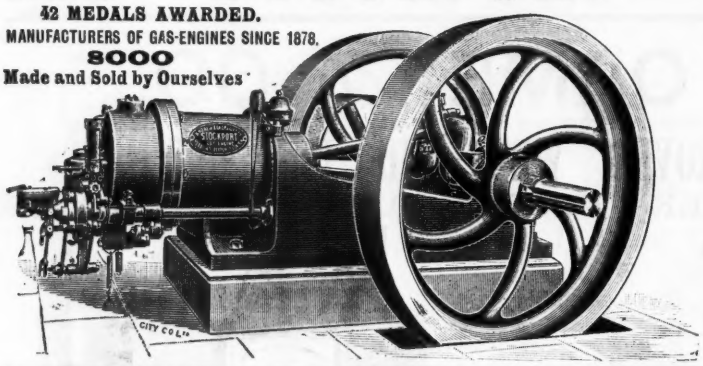

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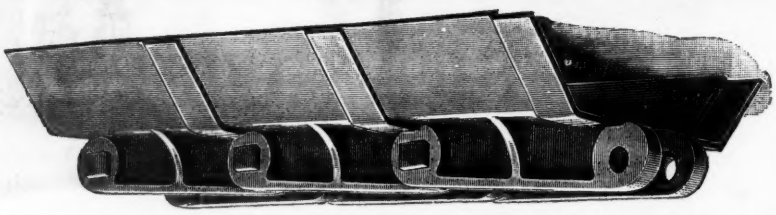

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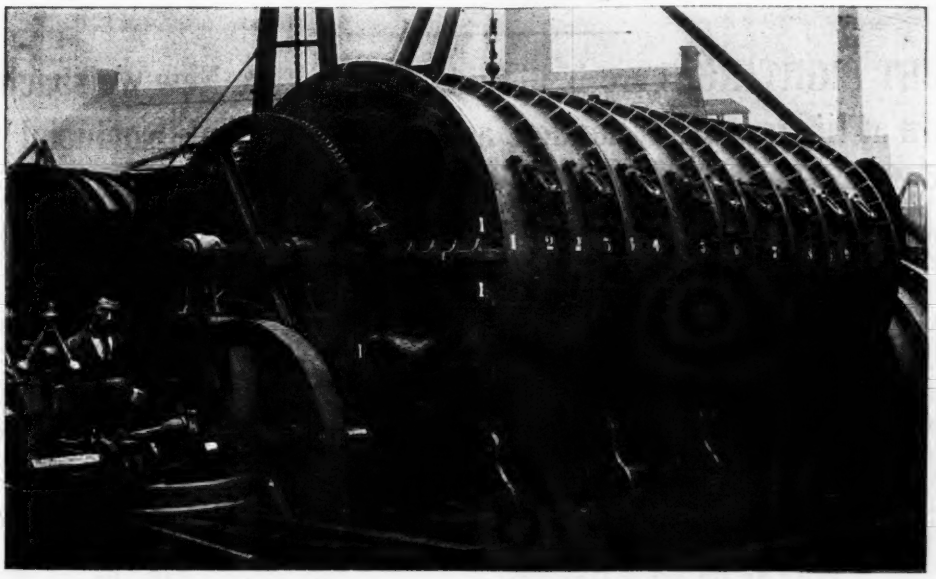

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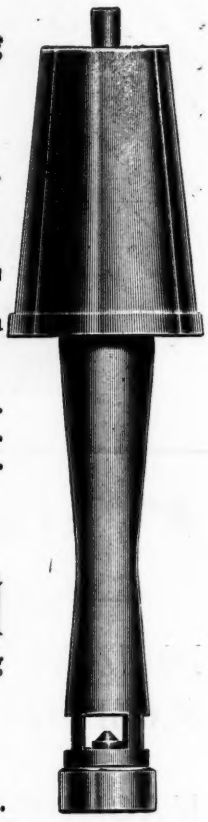

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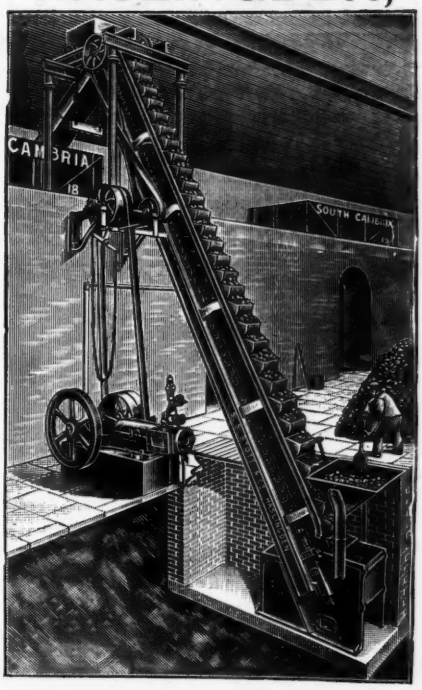

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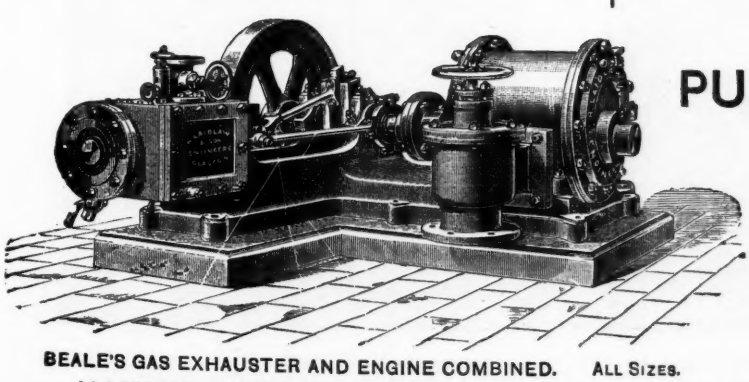

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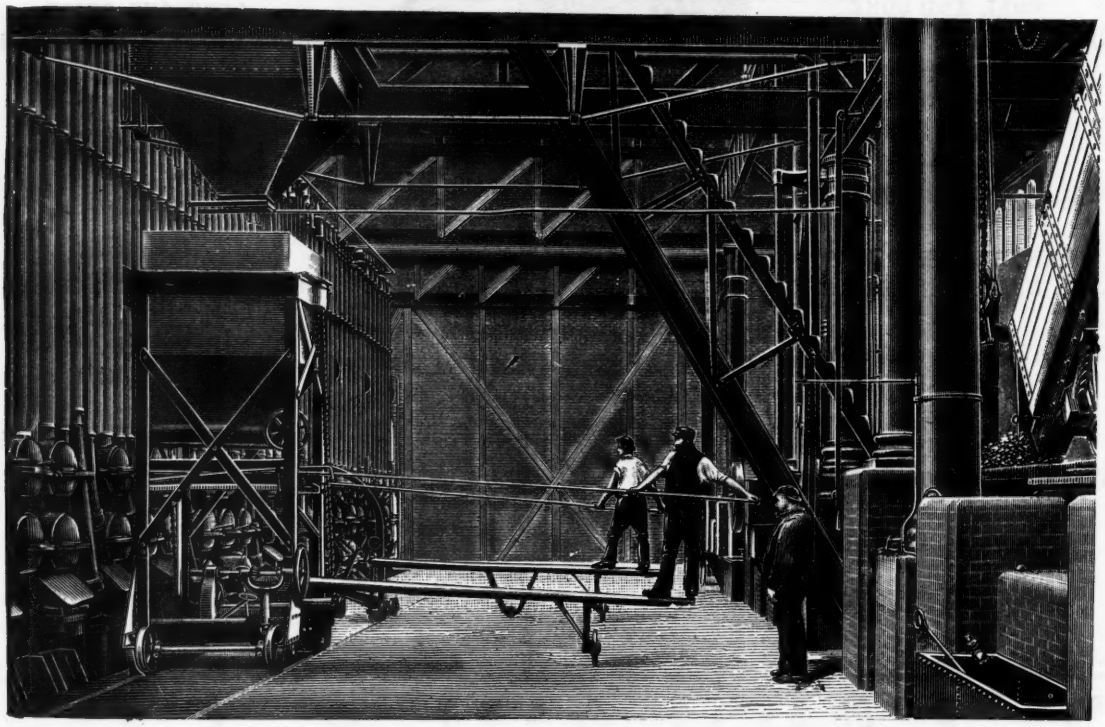

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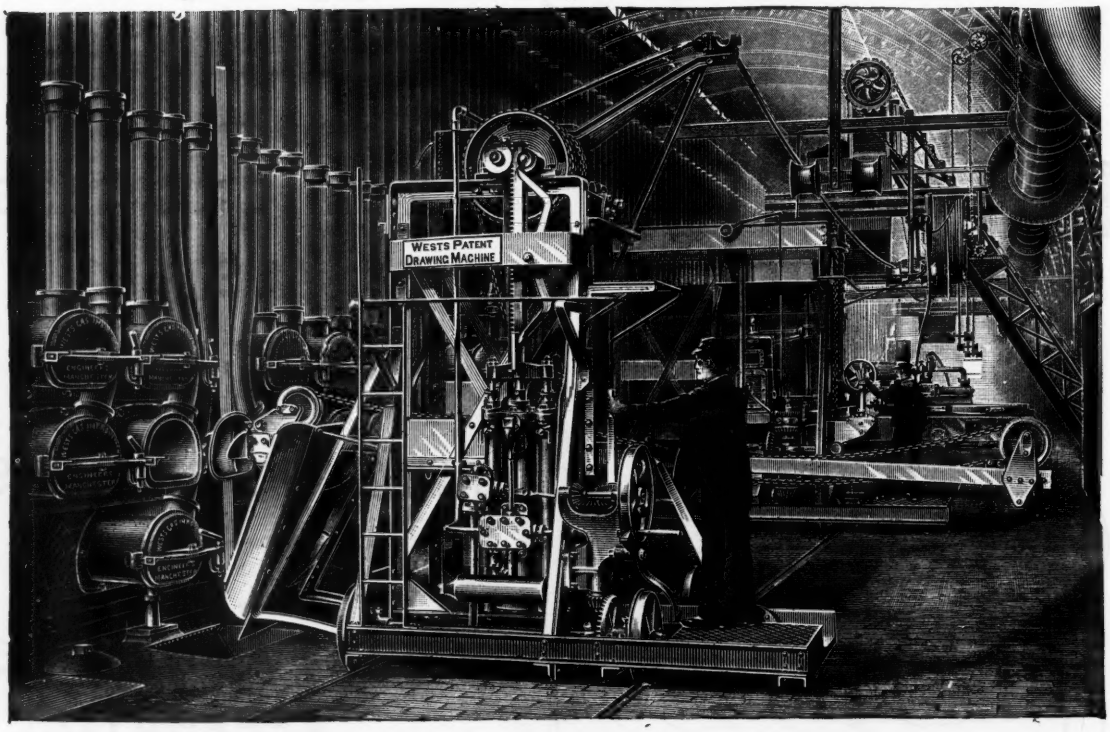

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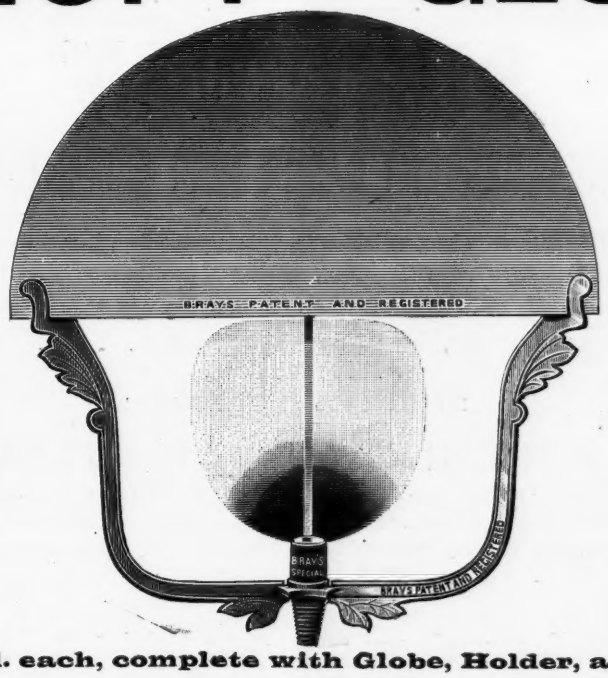

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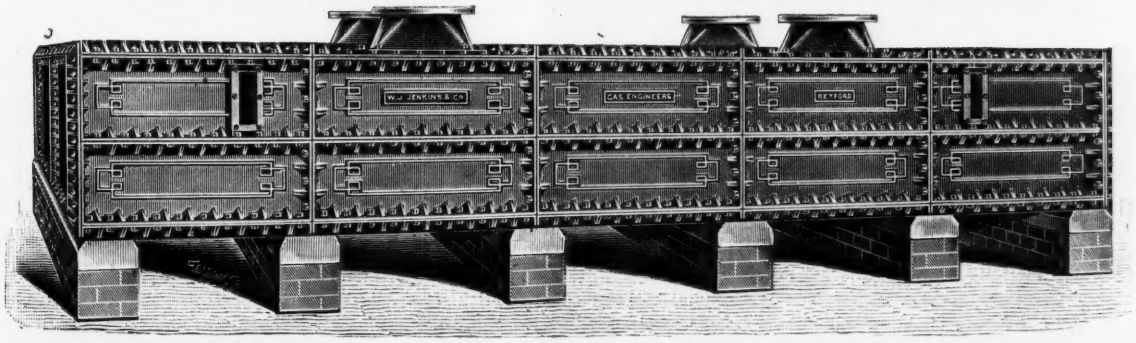

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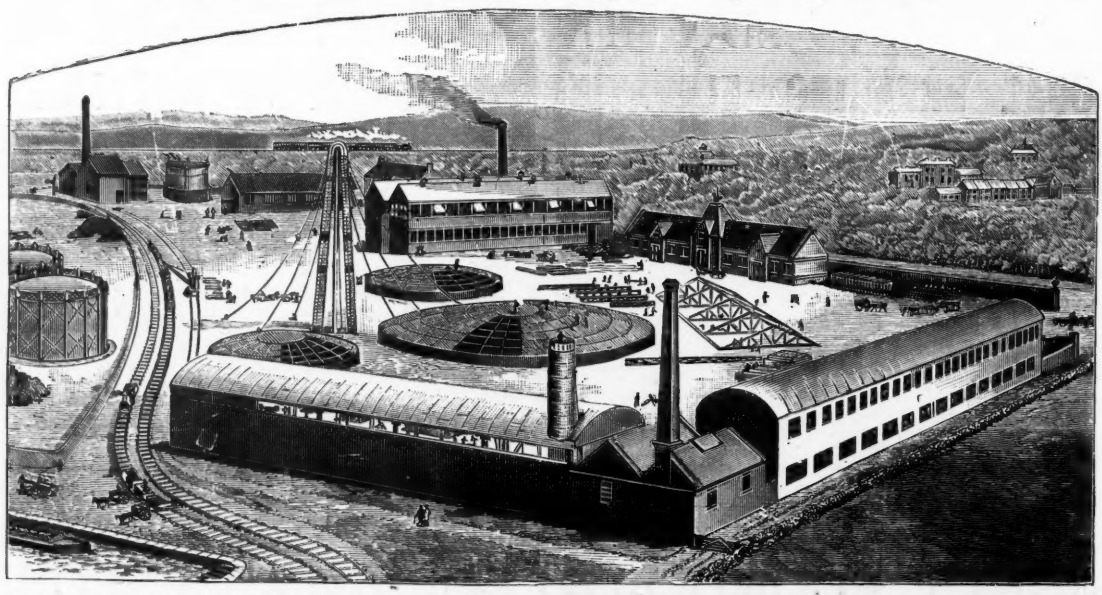

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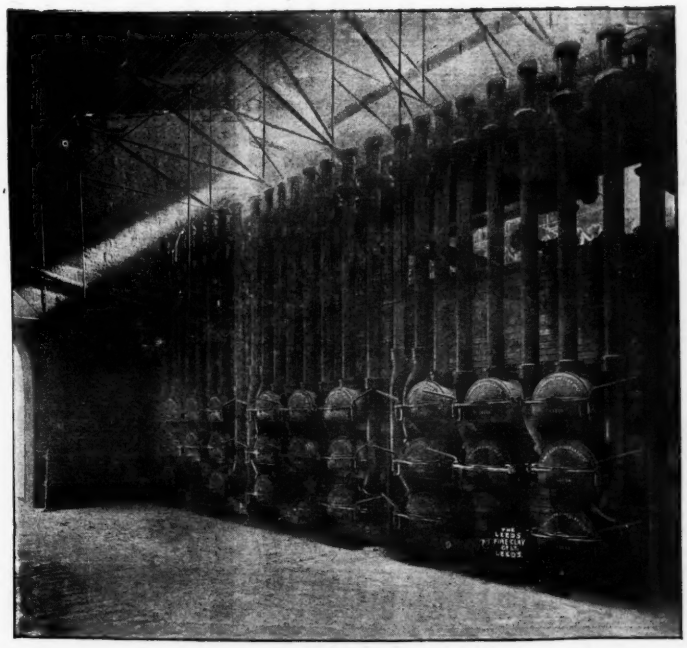

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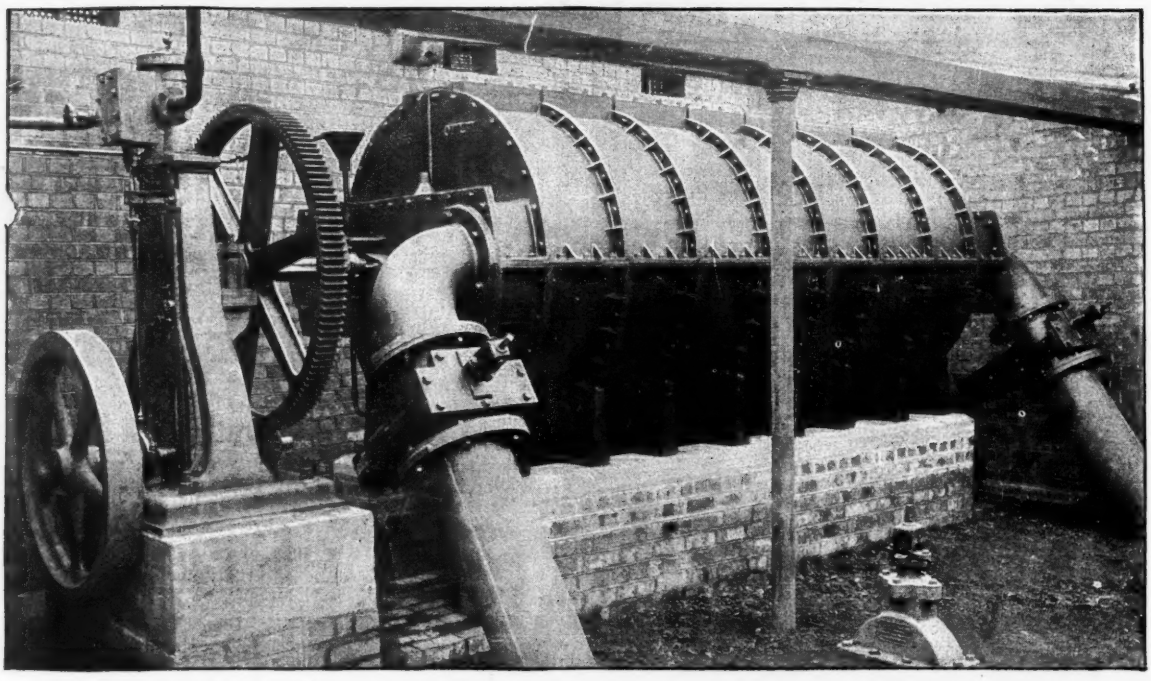

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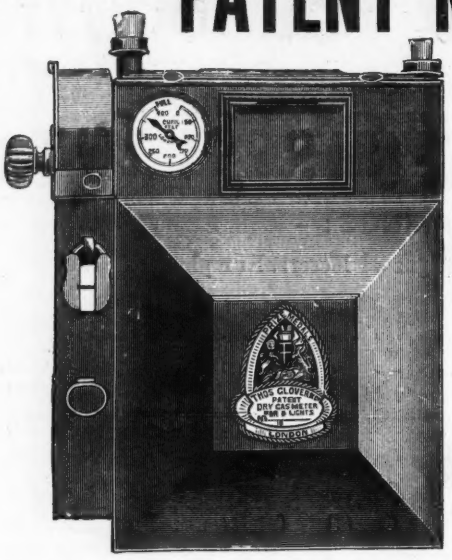

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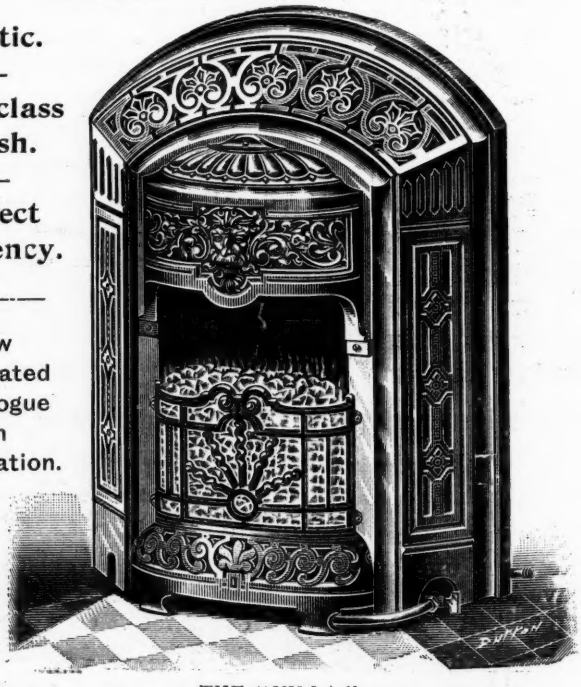

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EDITORIAL NOTES.

The London Municipalities Bill.

THE serious work of the parliamentary session was begun on Thursday, with the introduction in the House of Commons of the Government Bill for the reform of local government in London. This is to be the chief piece of constructive legislation of the year; and it is pleasing to be able to report that the principles of the Bill, as sketched out by Mr. A. J. Balfour in a lucid speech, are such as seem likely to secure adhesion from all parties in the House. Indeed, the reception accorded to the Ministerial scheme was most cordial, which is a very remarkable testimony to the broad merits of the proposed settlement of a difficulty that has awaited solution for many years, during which multifarious remedies have been proposed. Now that it has come, the plan to which the Government of the day have committed themselves has the appearance of a simple and natural development of the germ of Municipal Government which was planted in London about the same epoch that saw the municipal awakening of the great towns throughout the land. There is absolutely nothing artificial in the whole measure. A possible difficulty has been avoided by leaving out the City of London; and much political opposition has been disarmed by similarly leaving the London County Council scarcely touched by the Bill. The main object of the Bill is to erect into distinct Municipalities, with mayors, aldermen, and councillors, such Metropolitan districts as may now be ripe for receiving this dignity. It will help the world to better realize the size and wealth of London, when it is known that none of these new Municipalities will have a population of less than 100,000 nor more than 400,000, or a rateable value of over £500,000. They will probably number about thirty.

As is well known, the Greater London outside the City is at present divided for local government purposes among a number of statutory Vestries, with the capital letter, District Boards of Works, and vestries of the lower order of importance. Some of the areas thus administered are regarded as ripe for the grant of Municipal Corporations almost as they stand. These are: Battersea, Camberwell, Chelsea, Fulham, Hammersmith, Hampstead, Islington, Kensington, Lambeth, Lewisham, Paddington, St. Marylebone, and St. Pancras. All Londoners recognize the territorial individuality of these great Metropolitan divisions. Wandsworth and Poplar, now under District Boards, are to be incorporated with the first batch. An interesting proposal comes next, for the reconstruction as a great Municipality of the ancient City of Westminster. This is sure to prove intensely popular with all upholders of the principle of continuity in the matter of government, and is alone enough to save the Bill. After come more than twenty districts and areas whose boundaries will remain to be ascertained by a Commission to be appointed for the purpose, and settled by the Privy Council. They include such regions as Holborn, Mile End, Whitechapel, and St. Saviour's, Southwark.

The new Corporations are not to have any formal connection with the London County Council, as by the mayors being *ex-officio* aldermen of the central body, or anything of the kind. Their numbers are to be limited to 72. One-third of the councillors will be elected every year, on Nov. 9. As nearly as possible, the constitution and ordering of the London Corporations will be similar to the other English Municipal Authorities of the same grade. Their powers will also be largely the same, with certain important exceptions. It is worthy of special notice that the Metropolitan Municipalities will have the smallest possible opening for embarking upon trading enterprises. They will have no opportunity for dealing in water, gas, tramways, or telephones; nor will they have control of the main drainage, police, hackney carriages, and many other ordinary cares of Provincial Local Authorities. Some of them may do a little in electric lighting; but not many. It is proposed that they should have the power of promoting and opposing Bills in Parliament under the Borough Funds Act; and to some extent they will retain their separate finance. Broadly speaking, however, these London Corporations will be administrative authorities pure and simple, without temptation to tamper with trade of any kind; and as such they

will almost stand alone in the land. They ought to do their work well; and we believe they will do so. Questions of rating are to be adjusted, and the burden equalized. Every area will have but one rating authority, who will issue one demand note, which will show the ratepayer what he is rated for.

Most of the criticism already directed against the Bill relates to alleged errors of omission. Some people are wroth with the Government for leaving the City alone, as though there were any urgency in this regard. The City is within a ring fence; and there it can remain until the rest of London is reorganized. At any time afterwards, if matters are going on satisfactorily outside, it will be easy to make the City like unto the rest of the Metropolitan area, having due regard for the preservation of its unique corporate life, which the Empire at large would be sorry to see brought to a close. Also, there are cries for the transfer to the new authorities of the powers of the Guardians and the Asylums Board; but these demands are premature. On the whole, the Bill, so far as one is at present able to grasp its proposals, must be characterized as a good and wise measure for making provision for the better government of the Metropolis of this vast Empire, itself the greatest city the world has ever seen, upon the safe and sound lines of historical continuity and natural development. What stirring times are these in which we live, when we are informed one morning by our newspapers that a Minister of the Crown calmly proposes to create by Act of Parliament no less than thirty new borough towns equal to any in the land in wealth, activity, and working power; to revive by a word a city that has helped to mould the civilized world; and to surround the hoary old City of London with a ring of daughter Municipalities such as have sprung from no other fountain of liberty, enterprise, and order under the law!

The Manchester Institution Meeting.

From every point of view, the meeting last Saturday may be deemed a great success. To begin with, there was an instructive visit to the Gaythorn station of the Manchester Corporation, to inspect the coke conveying and stacking machinery in connection with the range of inclined retorts which was inspected last September during the meeting in the city of the Institution of Gas Engineers, as described in the "Journal" at the time. Then there was an excellent attendance of members throughout the whole afternoon, who were well rewarded by listening to the Inaugural Address of their new President (Mr. R. G. Shadbolt, of Grantham), who gave further expression to the views on certain topics which he is known to hold, and couched in language it is always a pleasure for his audience to listen to. The discussion of Mr. Brearley's paper read at the November meeting was fairly well maintained, considering that it was a deferred discussion, and on a subject too that did not—by its title, at all events—appeal to the great bulk of the members. Finally, the weather was perfection, and rendered it a pleasure to be out, even in Manchester. The only blot on the proceedings—and it is really one that should be considered by the ruling authorities of this and other similar Associations—was the unconscionable time occupied at the beginning of the afternoon in a long series of formal motions by which the Committee were reconstituted for the present year. Considerably more than half an hour was cut to waste in proposing for election as Senior Vice-President, Junior Vice-President, and so on down to the Auditors, a set of gentlemen eminently suited for the several positions to which they were recommended, and to not one of whom was the slightest objection advanced. Surely the same end would be attained by the circulation of ballot-papers among the members with the notice calling the February meeting; thus conserving the time of the members for real business. Similarly at the end of the year, why should not one inclusive vote of thanks be passed to all the officers for their labours in the interest of the Institution, and this be acknowledged by the President in his own name and for the officers who have been associated with him during his year of office? It is to be noted that the Manchester Institution are by no means alone in their action in this regard; but they could well afford to set an example of being the first to give up a practice so wasteful of precious minutes out of the limited time that can at the best be devoted to these quarterly and annual meetings. We commend once more to the ruling authorities of all these technical Societies the time-saving device described in these columns on July 19 last, as having been adopted by the Western Gas Association of America.

The passages of Mr. Shadbolt's address which will be found most suggestive are those in which he hints at the possibility of still further improving gas-generator furnaces and systematizing condensation. The latter subject led the President to his own speciality of the "self-enrichment" of gas, as to which he told an interesting story of feeling after results, step by step. It is worthy of being put upon separate record here, that, when employed under conditions plainly stated in the address, Mr. Shadbolt's method is claimed to give enriching results up to $1\frac{3}{4}$ candles. This is at the expense of the oils and creosote of the condenser tar. Besides the enrichment effect, the cure of naphthalene troubles is an additional advantage of the process! We cannot help the note of exclamation. It is not used out of disrespect to Mr. Shadbolt; but, really, these naphthalene cures are becoming quite alarmingly common. One thing more said by Mr. Shadbolt respecting the naphthalene nuisance is worth serious attention—the connection he emphasized as existing between the humidity of purifiers, the action of revivification *in situ*, and the deposition of naphthalene. Altogether, the address is a valuable contribution to contemporary technical literature.

The Meeting of the Liverpool United Gas Company.

The half-yearly general meeting of the Liverpool United Gas Company was held on Tuesday last; Sir Edward Lawrence being in the chair. The report of the Directors and the statement of accounts showed that the working of the undertaking during the past six months had been almost exceptionally successful and satisfactory. As the Chairman remarked, though the Corporation of Liverpool have gone very largely into the electric lighting business, they have not been able to take up the Gas Company's normal increase. Possibly the Directors wish the Corporation could effect this, because not even the most rabid local critic of the Company can say that the existing proprietors benefit in any positive way from this incessant growth. On the other hand, it forces upon the management the duty of making provision for the supply in ever-growing bulk of the highly carburetted gas demanded by the locality. This consideration raises the vexed question of the auxiliary supply of carburetted water gas; and it is not surprising that the Chairman should have devoted the greater part of his speech at the meeting to the subject of the Home Office report. An enormous amount of nonsense has been talked about the character of the Liverpool gas supply; and fortunately the report disposes of some of the allegations that have been most persistently made in the district against the Garston product. Sir E. Lawrence's references to this matter were very much to the point, and in the good taste which is never lacking to him. He does not believe there is any real harm in sending out carburetted water gas as the Company do it, or, of course, the Directors would never have countenanced the proceeding. Still, if Parliament in its discretion decides to impose regulations in restriction of this manufacture, the Company will bow to the decision, and carry on their undertaking accordingly. It will not be the shareholders, he might have observed, who would suffer any inconvenience from this alteration of the Company's operations. The Chairman went on to condemn certain language held with regard to the Company's proceedings by members of the Corporation of Liverpool. As we reported the other day, an Alderman remarked that if the Company were allowed to produce water gas, he feared they would be able to defy the competition of the electric light for many a long day. They have some funny Aldermen in Liverpool. When we noticed this fatuous observation first, we regarded it as a feeble attempt at wit by the speaker; but it is now made to appear that he was really serious. There are, it seems, persons in the Corporation whose motive in taking up with the agitation against carburetted water gas is not regard for the public health or safety, but a desire to cripple the Company. This is simply disgraceful; and we cannot believe that any considerable proportion of the people of Liverpool would be parties to such unfairness. Let the Corporation fight the Company with the electric light, which is legitimate competition; but they must not tie the Company's hands.

The Working of the Workmen's Compensation Act.

A dead-set is being made in some quarters against the Workmen's Compensation Act, 1897; and those politicians

whose ruling idea is abuse of Mr. Chamberlain, are greedy of every bit of evidence they can find to show that the Act is not working well. Now it is the employers who are asserted to be dissatisfied with the Act; and then it is the men who are declared to be getting more harm than good by it. We have carefully looked into every complaint of the kind that has come under notice, and are of opinion that there is nothing in them to blame the Act for. The accusations from the men's side belong to two categories which destroy one another. Half of them relate to alleged injurious effects of the Act; and the other half consist of complaints of those who are left out of it. If the Act is so bad for the working classes as some politicians make out, the remedy should be repeal; but with the same breath in which they condemn the Act, these critics call for its enlargement. The classes of employers and workmen who seem to have the most legitimate reason to complain of the operation of the new law are those engaged in coal mining; and the explanation is not far to seek. It is that the men's Unions in some of the coalfields have insisted on the strict letter of the law being observed, to the exclusion of the old mutual arrangements which worked so well, and as a rule were of greater benefit to the workpeople. Naturally, as the men's leaders showed this temper, the masters gave them their way, with the result that was to have been foreseen. It is a weakness of the lower classes of the community to "stand upon their rights," especially if the rights are newly discovered or freshly granted. They suspect those who would persuade them that legal rights are not everything. Hence the coal miners have been working the new Act for all it is worth in some districts; and they are now beginning to discover their mistake. For the moment, both masters and men are inclined to blame the Act; but there are signs that its acknowledged and intentional shortcomings will bring the parties together again in the organization of Relief Societies. The exemption of the first fortnight from the reckoning of compensation under the Act is a powerful lever for displacing it altogether in favour of some mutual arrangement; and the same may be said of the limitation of claims to the near neighbourhood of works. A great deal too much is made of the "litigation" and "friction" arising under the Act in regard to claims; but most of this is unnecessary, and is promoted by influences generally inimical to industrial peace. There is no prospect of the Act being touched by Parliament this session; and by another year it may be expected to have settled itself upon a solid basis of practice.

The Threatened Lock-Out of Plasterers.

THE condition of affairs in the building trade up to the end of last week was very interesting and instructive as regards the working of a strong and militant Trade Union, such as that of the Plasterers. We last mentioned the subject on the 31st ult., when the National Association of Master Builders were about to take counsel as to what should be done to meet the emergency caused by the tactics of the Plasterers. On the first of this month, the Association addressed a letter to the Secretary of the Plasterers' Union requesting an official and definite assurance that certain objectionable practices should be discontinued. These practices included the attempt to coerce foremen into joining the Society; the limitation of apprentices; the boycotting and black-listing of firms in spite of the fact of the firms adhering to the rules agreed between the associated employers and the Society; refusal to work with non-Union men; refusal to abide by the employers' ruling in delimitation disputes; refusal to refer disputes to a conference of employers and workmen with the object of avoiding strikes. Fourteen days were given for the Union to reply; and when this came, it was an evasion. The Secretary of the Union stated that the resolution that all foremen should join the Union had been withdrawn; but as to all the other matters put forward by the masters, no satisfactory answer was vouchsafed. The employers thereupon wrote again, requesting a definite assurance that the objectionable practices should be stopped, and giving another week for the answer. An insolent letter from the Union Secretary was the result; and thereupon the masters sent back a notification of their intention to lock out all Plasterers as from Monday next, until such time as the Society offer a guarantee that the objectionable practices shall cease. Meanwhile the Union Executive issued a "manifesto" to their members, stating that "having failed to come to "terms" with the master builders, the issue must now be left with the men. This communication was in the usual fustian; the masters' terms being characterized as being such as "they know perfectly well cannot be accepted by "any body of Trade Unionists without sinking the manhood "of its members." The manly individuals addressed were also adjured to retain the name they had already won for themselves among the Trade Unionists of the country "and maintain that manhood and right of combination "dear to the hearts of every member of a trade organiza-"tion all the world over."

Such remarks upon the masters' temperately worded propositions would be ludicrous if they were not fraught with such deplorable mischief-making intent. But this is not all. The Union Executive proposed to ballot their members last Saturday; the votes being returnable on the 1st prox. Everybody knows by this time what a Trade Union ballot is. It sounds like a means of taking the free and independent suffrages of the members in regard to a matter; but in practice it is never anything else than a wire-pullers' dodge to obtain support for a foregone conclusion. It may be doubted, however, whether any ballot paper referring to a trade dispute was ever so impudently drafted to serve as a downright "bull-doser" as that issued by the Executive of the Plasterers' Union on this occasion. To begin with, all overtime is ordered to cease "until the present dispute, thrust upon us by "the employers, is at an end." And the questions are so put to the men that, as the "Daily News" confesses, they almost preclude the possibility of the voting being other than for a "dispute." This "extraordinary docu-"ment," as it is styled, is really too much even for that fast friend of Trade Unionism in the past, the "Daily "Chronicle." This newspaper admits that the course taken throughout this unfortunate business by the Union Executive is unjustifiable; and that the deadlock in the building trade has been precipitated by "a silly display of "temper and maladroitness on the part of a few men," following up an "initial blunder" of the Union in seeking to coerce the foremen. After all, the cause of fair-dealing and order in industrial concerns must be looking up, if the "Daily Chronicle" has been brought to see that a Trade Union is not always and necessarily in the right of a trade dispute. In the present instance, if the lock-out of the Plasterers becomes an accomplished fact, it will be impossible to limit the area of the struggle. Incidentally, one wonders how the much-vaunted cause of the federation of Trade Unions will stand affected by the outbreak of this important Society; but this is a small matter compared with the far-reaching effects of a stoppage of one kind of building work. The best thing the other Unions in connection with the building industry could do in this emergency would be to sit down heavily on the Plasterers. If the malcontents of this trade realized that they had nothing to expect except kicks from other men, they would think twice before throwing up their jobs at the bidding of a few stupid officials in their own pay. The Union is not financially strong—the accumulated funds being barely equal to £1 per head of the membership; and, of course, if all the members are locked out there will be no levy.

WATER AND SANITARY AFFAIRS.

THE Government Bill for establishing intercommunication between the works of the London Water Companies, was last week introduced into the House of Commons by the President of the Local Government Board. The only dissentient voice which followed was that of Mr. Sydney Buxton, who, as an East-end representative, thought fit to criticize the Bill as being of "the most futile and micro-"scopic character." The Poplar member seemed to consider that the Government should do nothing to improve the present supply until they could bring forward a measure dealing with the entire Water Question. Yet he was constrained to say that he should not oppose a Bill intended to effect communication between the mains of the London Water Companies. This inconsistent attitude was explained, not only by the speaker's relation to an East London constituency, but by his reference to the subject of "purchase value." If he found the provisions of the Bill were at all likely to prejudice this question, or to interfere in any way with the constitution of the future Water Authority, he said he should feel it his duty to oppose the measure. "Microscopic" as the Bill may be,

it is apprehended that it will yet have an influence in the final settlement of the leading issues. So we find the weekly organ of the Progressive party, in making a forecast prior to the appearance of the Bill, expressing its apprehensions concerning the Government measure by saying: "There is just the danger that it may prejudice "the question of purchase by further enhancing the value "of the undertakings." We may suggest the further "danger," if so it may be called, that by linking up the mains of the Water Companies it may become so evident there is water enough for all London, now and for many years to come, as to convince Parliament there is no need for any Welsh scheme. That the value of the undertakings will be enhanced by anything which adds to their efficiency, is highly probable; while that which prevents their adaptation to the wants of the community will have a contrary effect. The interests of the County Council, as understood by that body, are thereby adverse to the satisfactory working of the present system of supply, unless it can be arranged that the undertakings shall be increased in value without raising the purchase price. A device of this kind is to be found in the Staines Reservoirs Act, and is reproduced in Mr. Chaplin's Bill. It is thus provided that if the undertaking be purchased by any public body within seven years after the passing of the Act, otherwise than by agreement, nothing in the Act shall be held to authorize the Company to make any claim "in respect of "any advantages" conferred on them by the statute. Of course, the capital expended cannot be ignored; but no advantage gained by its expenditure is to come into the reckoning. The party selling might plead that this is not "business." But the purchaser will call it "policy."

There was a second edition of Mr. Chaplin's Bill, coming a day later than the first. The later issue was an amended version, differing from its predecessor by an extension of the clause relative to raising money by the issue of debenture stock; the effect being to exempt such stock, created for the purposes of the Act, from the obligation of contributing to a sinking fund. The whole process of a sinking fund, as applied to the undertakings of the London Water Companies, is both unjust and absurd. Its present application is very limited; but even in its current form it threatens, as time goes on, to operate very injuriously. A sinking fund applied to the whole of the capital account, as would be the case if the County Council held possession of the water supply, would be a burden which the Council themselves might desire to get rid of. From first to last, Mr. Chaplin's Bill is a perfectly reasonable measure, carrying out the recommendations contained in the interim report of the Royal Commissioners, who preferred that the Bill should not lay down a complete scheme, but should consist of "elastic clauses enabling the Companies to execute from "time to time such works for the purpose of inter-"communication" as might be authorized by the Local Government Board. Perhaps the Bill falls short in not providing for an increased draught of water, though it implies full powers of intersale. Of course, the Government measure will not please the Progressives, whose hopes are centred in their Purchase Bill. This awaits a second reading on the 16th prox.; Mr. Stuart professing to believe that the views of the Royal Commissioners on the subject of purchase will be known "at a fairly early "date." He speaks as if expecting the Commissioners to make a special report on the purchase question, apart from anything else that remains in the list of instructions. But the question of purchase is not a simple one, though Mr. Stuart may conceive that it only admits of one answer.

The evidence given last week before the Metropolitan Water Supply Commission was largely of a statistical character. The idea that a rise in the valuation of property operated to the advantage of the Water Companies was singularly contradicted in the case of the Grand Junction Company. Mr. Tendron, the Chairman of the Company, stated that the valuation of unaltered premises in their district showed a net increase of £8365 in 1891 as compared with 1886. This would add about £400 per annum to the Company's revenue; but, on the other hand, there was an increase to the extent of £2258 in the rates charged on the Company's works. The same process went on in the next quinquennial valuation. It is difficult to get recognition of the fact that the London Water Companies are large ratepayers; and we have more than once invited attention to the effect that would be produced on the rates if the water undertakings became the property of the County Council. By such a change, the amount which the Companies now contribute to the county rate would be virtually added to the profits accruing from the water supply. But the rate must still be made up in some way; and it seems inevitable that the ratepayers must make good the difference. That is to say, the county rate now paid by the Water Companies must be borne by the ratepayers. That it would come back again in the shape of a reduced water-rate is a contingency too remote to be reckoned upon. It is exceedingly doubtful whether the County Council would make any profit out of the water supply; and if they did, they are evidently prepared to spend it. A considerable sum is at stake in this affair; the rates and taxes paid by the London Water Companies in 1897, exclusive of income-tax, exceeding £238,000. The rapid growth of this burden is shown by the circumstance that in 1887 the amount was only £142,000; the increase in ten years being £96,000, or fully 67 per cent. Growing assessments, therefore, are not all in favour of the Water Companies; the rates and taxes they have to pay being 11 per cent. on their gross income, while the much-envied Directors take but 1·35 per cent.

The argument that the Water Companies ought to be continually writing off capital on account of depreciation of works is clearly shown to be inapplicable, seeing that the Companies maintain and renew their works out of revenue. Mr. Harry Wilkins, the Secretary of the Lambeth Company, very properly represented to the Commissioners last week that for this reason there was no justification for writing off capital simply because it was sixty years old—engines, mains, and other appliances being kept up by an expenditure which the revenue had to bear. To this there may be some exceptions; but the practice is largely as stated. The opponents of the Companies are apt to talk about "obsolete capital;" whereas the works on which the capital so referred to has been expended, have been almost always renewed at the expense of revenue. The question of the sinking fund also came before the Commissioners, and was the occasion of grave complaint. Mr. Wilkins denounced as "most atrocious" the clause which creates this device; one effect being that the Companies would have to raise money on debentures not only without profit, but at an actual loss to the shareholders. In more than one way we have proof that the Companies are rendered subject to exceptional legislation; being made the victims of Radical *doctrinaires*. It only needs the water supply to be handed over to the County Council in order that the people of London may learn the merits of the Water Companies. The latter can speak faintly amid the present commotion; but by-and-bye the facts will speak for themselves. What the Royal Commissioners will have to say we cannot pretend to anticipate, though we are equally at a loss to believe that they will endorse the Progressive policy. The offhand remarks of Viscount Llandaff are too varied—we might almost say erratic—to furnish a clue to his own impressions. He has hit at the County Council, and he has shown his impartiality by hitting also at the Water Companies. He suggested to Mr. Wilkins that if Parliament would sanction an arbitration clause "remotely resembling" any of those proposed by the London County Council, the Water Companies would be "well advised" at once to open negotiations. Mr. Wilkins said he was "not sure about that." In fact, it is perfectly clear that the Companies are not going to consent to any unusual mode of arbitration, especially such as the County Council seek to impose. And why should they, except to please the purchaser who seeks to depreciate their property? Lord Llandaff and the other Commissioners cannot fail to see that the County Council seek to drive the hardest possible bargain with the Companies. As for the Progressive notion of splitting up the outer areas among the Local Authorities in the event of purchase, Lord Llandaff, when his attention was called to the scheme by Mr. Baggallay, said "it seemed like a *reductio ad absurdum*." Yet the Progressives will try to have the way left open for such an arrangement, hopeless as it appears from an engineering point of view, and from anything at all like a common-sense judgment of the subject. But the idea pleases the Local Authorities; and the Progressives desire their goodwill.

Paris Gas Company.—The revenue of the Paris Gas Company last year was 80,971,744 frs., or £3,238,870, as compared with 80,162,526 frs., or £3,206,501 in 1897. The income therefore increased by 809,218 frs., or £32,369—1·01 per cent.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 540.)

ANOTHER very heavy account was the feature of last week; and the Stock Exchange is making large strides in the way of compensation for the slackness of trade last year. Judging, too, from the amount of fresh business transacted during the week, there is reason to anticipate that the rate of activity will be fairly maintained. With hardly an exception, the markets were firm; and prices show a general, though moderate, advance upon the opening figures. In the Money Market, there was a brisk demand arising out of the Stock Exchange requirements, which created momentary tension. There is nothing in view to point to any hardening of the rate; but rather the other way. In the Gas Market, the volume of transactions was considerably lighter than in the preceding week; but this was coupled at the same time with decided signs of strength and firmness. All changes of quotation were in the upward direction; and several issues which were quoted *ex div.*, after lying some time dormant, were without exception advanced. In Gaslights, the ordinary opened a little better than it had closed on the previous Saturday; and, after a bit, it began to rise, and finished off with a mark of 118¾—the best of the week. The secured issues were rather quiet and motionless. South Metropolitan was less active, and showed no disposition to go higher. Commercials were quiet and unchanged. Very little business was transacted in the Suburban and Provincial group, except in British; but they all presented a strong line. Brentford, Bromley, Crystal Palace, and Newcastle gained on *ex div.* variations. The Continental Companies were only moderately busy. As a rule, they were firm; but Imperial was uncertain, and the quotation was opened out to nominal figures. Among the rest, Bombay, Buenos Ayres, and River Plate had a further advance. Business in Water did not rise above its usual proportions; and issues generally were firm and unchanged. But Southwark was more heavily dealt in, with a view to taking a profit after the recent large advance, and so it relapsed a couple of points.

The daily operations were: Business in Gas showed a disposition to be quieter on the opening day; but prices as a rule were very steady, except for Imperial, which receded 1. On Tuesday, business was almost wholly confined to the Metropolitan Companies, which were steady and unchanged. Bombay rose ¼. In Water, Southwark ordinary fell 2. Wednesday was a rather quieter day; but prices were good, and they pointed upwards. Brentford new gained 3, and Buenos Ayres ¼. On Thursday, Gaslight issues were the most noticeable; the ordinary advancing 1, and the maximum changing hands at 103, though the quotation was left unchanged. River Plate rose ¼. Imperial was weaker. Friday was quiet; but Gaslight ordinary continued to harden. Nothing was done in Imperial; but the quotation was opened out to a 10 per cent. margin. Saturday's business was moderate, but good; and Gaslight ordinary rose 1 more.

ELECTRIC LIGHTING MEMORANDA.

A Nernst Light Company Promotion—A Case for Waiting—Are The Pit-Head Electrical Generation Schemes Meritorious?

THE carefully-prepared promotion of a Nernst Electric Light Company, Limited, anticipated in this column last week, has come to a head very suddenly; and by the time these words see the light of publicity the British public will either have been "had" once more over an electrical venture, or the astute promoters will have shot their net in vain. The whole affair transpired last week; and the subscription list closes to-day and to-morrow. There is something more than the usual degree of vagueness about this venture. Our electrical contemporaries have been greatly mystified over it; and one of them at least has succeeded in puzzling us. The "Electrical Review," which had prepared us for what was coming, gave last Friday some "further details of the proposed Company, taken from an article which appeared in the 'Financial News' of last Monday." This article was stated to have been headed "The Nernst Electric Lamp, an Invention to do for Electricity what the Welsbach did for Gas;" and it was justly observed that this title was "eminently calculated to cause a 'boom' in the Nernst lamp shares." We have searched the "Financial News" of the day named—Monday, the 20th inst.—in vain for this article. There is nothing of the kind in the newspaper in question; and the mistaken reference is vexatious. The "Electrical Review" goes on to state that out of a capital of £320,000 the Company are "to pay £270,000 in cash and shares (£65,000 in cash) for the patent rights in the United Kingdom, and certain specified colonies and dependencies." We turn to the complete prospectus, published in the "Electrician," and find that the Company have been formed to acquire and work in the countries "mentioned hereafter" the patent rights (free from any royalty) of the Nernst electric lamp. Among the countries named, the United Kingdom is *not* included.

This is a very serious matter. Anybody would think from the name of the Company and the parade of names upon the front page that it was *the* Nernst Company—a concern formed to exploit the Nernst invention generally. Instead, one has to turn to the end of the prospectus to learn that the Company's operations are to be restricted to the "Argentine, Cape Colony, Egypt, New South Wales, New Zealand, South Australia, Victoria, and *Venezuela*." The last-named land of promise really caps the programme. It is confessed in passing that the Company will have nothing to do with any country in Europe, or with North America and Canada. This being the case, the whole promotion looks perilously like a "wild-cat" scheme. Of course, those who read the prospectus carefully through will not be deceived as to the scope of the Company's proposed operations. But when the "Electrical Review" is deceived in this regard, others may fare the same. The gravest objection is to be taken to the name of the Company, which does not convey any intimation that it has so restricted a field. What is to be thought of this promotion?

People with money to invest had better keep out of Nernst Companies for awhile. It is a thousand pities that one cannot enjoy a performance such as Mr. Swinburne's lecture and demonstration at the Society of Arts without the fear that while we are gaping at the new wonder, somebody will seize the opportunity of tapping our pocket. Venezuela, forsooth! Who thinks of the splendid opening for electric lighting offered by these outlandish places when invited to take shares in a Nernst Lamp Company? The Nernst property for the United Kingdom and Western Europe is stated to belong to the Algemeine Electricitaets Gesellschaft, of Berlin. Much good may this very enterprising Company derive from working the patents. Nobody need envy them; for it will be a long drag before the lamps share the shops and streets with Welsbach gas-burners. Those who live by the carbon vacuum bulb principle of incandescent electric lighting will certainly fight the new comer to the death. They are even now making the most of its acknowledged drawbacks of requiring a preliminary heating, which means that it will take an appreciable time to light up; and of the nakedness of the incandescent body. We do not regard these as very serious objections to the system; but naturally that is because we regard it from the standpoint of gas lighting, which also needs external ignition and is a naked flame. It is only to be expected that the older electric lamp interest should set store by the undoubted advantages of their own system. It is handy to get a light by merely touching a switch in some convenient place; and the vacuum bulb is the safest means of lighting known. The points on which the Nernst lamp will beat the bulb are brilliancy and economy—two very strong claims.

A pleasing variety has been introduced into the controversy over the schemes for supplying electricity in bulk from pit-head generating-stations by the circumstance of numerous Chambers of Commerce, and some of the smaller Municipalities of manufacturing towns, giving their adhesion to the principle. Mr. Alexander Siemens has been down to Liverpool, talking to the business people as distinct from the municipal interest, about the splendid advantages of cheap electric power. He seems to have made a favourable impression; but, of course, everything must hang upon the merits of particular schemes. The point he has been desirous of emphasizing is that the great suburban factories, and the outlying communities, surrounding centres like Liverpool or Manchester, should not be compelled to take eletrical power, if they want it, from the central municipal undertaking, when they might get it much cheaper from a different source. There is no getting over the reasonableness of this contention; but we confess we should like to see it supported by cogent evidence that any of these pit-head schemes is meritorious. If the big Municipalities are really protecting the investor from sinking his money to waste in such ventures, as well as safeguarding their own territories from unjustifiable invasion, then we should support them in their proceedings in this regard; though not for their principal reason—the rapacity of municipalism. Why does not Mr. Siemens state the case for some pit-head scheme, on the merits, so that plain men may judge it? What he might say in this respect would be entitled to respect; which is more than can be said of the utterances of some of the electricians who have taken up with this branch of electrical enterprise.

The "James Forrest" Lecture at the Institution of Civil Engineers will be delivered by Professor J. A. Ewing on Thursday, April 20, at eight o'clock; the subject being "Magnetism." The lecture, which will be the seventh delivered since its institution, will be repeated the following day, at four o'clock.

The Future of Gas-Engines.—Mr. H. L. Towles has been discussing in the "American Machinist" the problems connected with the improvement of gas-engines, in order to make them efficient competitors with steam-engines. The conclusion arrived at by the writer is that what is needed to make the former motor do better is the reduction of the element of uncertainty connected with its chemical operation. He considers that to abolish this uncertainty the conditions affecting combustion must be subjected to positive and automatic mechanical control, so that it shall be impossible for them to vary without appreciable derangement of working parts. He thinks this may be considered at present the chief problem of the gas-engine, and one which it is absolutely necessary to successfully solve before the status of these engines is advanced.

MUNICIPAL TRADING.

FIRST ARTICLE.

IT appears, from recent proceedings in Parliament and other signs of awakening public interest, that the question of Municipal trading is about to be overhauled with reference to prospective developments. We have from time to time discussed the matter in the "JOURNAL," in regard to its general, and in many of its particular, aspects. It has not been always easy to do this without trespassing upon the indulgence of our readers for what has looked like the introduction of questions of party politics into the columns of a technical periodical. Our excuse for this seeming wandering out of our proper domain must be that, now politicians have become manufacturers and traders, it is impossible for manufacturers and traders to keep out of their way. It is they who have invaded our field; not we who have willingly gone to meet them. From the day, whenever it was, that Official Liberalism in national politics was made to embrace Progressivism, and this again was understood to be only another branch of Trade Unionism, which was mere Collectivism in practice, it became impossible for those who hold by the cause of Individual enterprise to decline the controversy forced upon them by the new brand of politicians as to how a large part of the work of active civilization is to be carried on. Collectivism used to clamour at Trade Union Congresses for the nationalization of the land and the railways, and other things; and so long as its voice was only heard at such assemblies, the working world simply listened as it passed by on its urgent business. In the course of time, however, the English Collectivists, with that abiding streak of common sense which they owe to their blood rather than to their German teaching, ceased crying for the moon, and addressed themselves to objects within their reach. Both French and German idealists might pound along the "No Thoroughfare," called Internationalism in labour politics; but after a brief experience of this sort of thing, the English Socialists of working-class origin quietly dropped it, and confined their energies to their own Trade Unions and the administrative organizations of their country.

The immediate result of this re-direction of the force of Socialism in English industrial life, was the rise of aggressive Progressivism in local self-government organizations. It began by extending the system of the Trade Union throughout the public services, until as regards wages and working hours the nominal authorities had to follow the lead of the Unions. Then the same Progressivism was identified with a cause which has its adherents in all political parties—the cause that has recently come to be known by the name of Municipalism. It is as superfluous as it would be difficult to define the meaning of this new term. It is sufficient that everybody knows what it signifies, and also recognizes the existence of the thing meant. It is manifested alike, and with equal fervour, by British Local Authorities of every political colour. There is only one fountain and origin for it, in most of these public bodies—the possession of some undertaking, of any kind, in addition to the normal and ordinary departments of local self-government. So general and customary have such additions now become, that it is even difficult to recognize the original functions of local governing bodies in their absence. One is inclined to ask what Local Authorities were like, and what they did, before they took to supplying their districts with those things and performing those services which were at one time supplied and done, if at all, by private enterprise.

Well, all that is matter of historical interest merely, and beside the question of the hour. Municipal trading has come to pass; and in so far as it is a natural development of a healthy Municipal life, it may be expected to grow and prosper. Like all human inventions, however, trading by Municipal Corporations and minor Local Authorities is liable to misapplication, exaggeration, and plentiful evil capable of being masked as good for mischievous purposes. The idea has been "captured," as the phrase goes, by a set of ignorant pretenders to be an "advanced" party in Municipal politics, who seem bent on riding it to death. Accordingly we see vulgar demagogues and their equally worthless newspaper supporters vaunting the virtue of Municipalizing all sorts of enterprises "on principle." These smatterers have gone far beyond the tradition which still lingers in Parliamentary Committee-rooms, that the question of "expediency" has to be settled before certain orders of undertakings are sanctioned as conducing to the public advantage. Their cry is "Municipalize, municipalize, municipalize!" and it is heard in season and out of season, without regard to merits or anything else but the fetish idea.

The actual position of the question of Municipal trading, for those who are not led away by the cry and can keep their minds clear from the cant of Progressivism, is the result of two powerful influences. One is the prevalent belief that the Municipalization of certain local supplies and services, as water and gas, has so far been to the public advantage. The other is the preference accorded to Municipal action along the same lines, first by the Tramways Act, and still more so by the Electric Lighting Act, 1882. It might be argued that the lately-born exaggeration of Municipalism, which has broken out in so many localities under the fostering care of the Association of Municipal Corporations, is born of the latter legislation. There is a proverb that says if one shows the cat the way to the dairy, one must not wonder if the cream is stolen. So it is with this fever of Municipalism. Beginning in the declared interest of the public, the cause easily passes on to the second stage of standing in its own interests. A Municipality undertake the supply of water to the population of the district, because they can do this cheaper, and possibly better, than a proprietary company or individual. So far, good. Now it has come about that a Municipality claim the right to prevent a proprietary company or individual supplying the population of the district with something—to wit, electricity—cheaper and possibly better than they can do the work themselves. So far has Municipalism discarded the basis of expediency as regards the major interest of the public.

It was inevitable that when this issue had clearly emerged from certain local agitations over particular projects, public attention should be directed upon it from opposite sides. Accordingly, in "The Times" of Jan. 23 Major Flood Page focussed the question of how far the expansion of the powers of Municipalities as traders should be encouraged, to the detriment of manufacturers and retail tradesmen. The writer observed that some seventy Local Authorities are promoting Bills in the present session of Parliament, asking for extensive powers for manufacturing, dealing in, and hiring out all manner of articles appertaining to the supply of electricity and other necessaries of town life. There is nothing new in this request, inasmuch as many Municipalities already possess statutory powers for keeping shop for many commodities. This fact, however, as Major Flood Page argues, does not alter the gravity of the main question. He might have stated, besides, that most of the older Municipal trading was in articles not likely to be dealt in across the retail tradesman's counter—such as water-meters, and so forth. The real point is that a new spirit has come into our Local Authorities, which are held up to public opprobrium nowadays unless they are "Progressive" in all things, including keeping shop with ratepayers' money; and the only pertinent question is how far this kind of "enterprise" is to go.

It is of all things essential to keep closely to the facts in dealing with any point upon which socialistic predilections have crystallized into Progressive "principles." Generalities are the sustenance of Progressive politics, which could not last long without their mouth-filling phrases that stand for facts, argument, and conclusion. This question of Municipal trading is precipitated from its previous state of solution by Major Flood Page's dropping in the details of electrical apparatus. He asks whether it is reasonable that a Corporation should be allowed to manufacture electric lamps, accumulators, dynamos, fittings, acquire patent rights, and all out of the rates. "Is it fair to the trade that Municipal factories for manufacturing such difficult articles as lamps and accumulators are to be built and worked by ratepayers' money, and in competition with the ratepayers themselves?" If lamps and dynamos are to be Municipal products in 1899, why not tramcars, omnibuses, and cabs in 1900, steam-engines in 1901; and so on? The Council of the London Chamber of Commerce have come to the conclusion that it is high time this kind of thing was checked; and steps are being taken with a view to define the limit of Municipal trading.

This last suggestion will not operate precisely to the effect mentioned. It is not the way of Parliament to "define the limit" of any movement indicated by proposals of legislation; but all such schemes are dealt with on the merits. This is a rule that Progressivism seems incapable of understanding. While, on the one hand, the Progressive Press scouts the notion that Parliament ought to lay down any such general law of Municipal trading as the London Chamber of Commerce contemplates, it clamours on the other side for parliamentary recognition of the general principle that Local Authorities' electric lighting powers should be preserved from competition. What Parliament has shown a willingness to do, by way of systematizing legislation on various subjects, is to refer a group of Bills raising the same general question to a Joint Committee of both Houses for special consideration. It is reported that this special treatment will be accorded to the Municipal trading provisions of the pending Corporation Bills. In this event, Municipalism will be brought to a perception of its position and pretensions; and not a day too soon. Meanwhile, the subject should be kept prominently before the public, with a view to the education of that great force, public opinion, which is behind Parliaments and Municipalities, and in the long run acts through these institutions. At this juncture, face to face with a threatened great extension of the system of Municipal trading, the public have a right to know what measure of success has attended this practice, so far as it has gone. This inquiry will be opened up by our next article under the same title as the present.

WATER BILLS FOR THE SESSION 1899.

(*Continued from p.* 434.)

THE Warrington Corporation Bill contains a part relating to water supply. Additional works are proposed, including a well and pumping station to be situated in the parishes of Houghton-Middleton, Arbury, and Southworth-with-Croft; another such station in the parish of Winwick-with-Hulme; a reservoir in the parish of Appleton-with-Hull for impounding the waters of the Dennow Brook; and a reservoir in Cheshire for impounding the

waters of the Daresbury Brook. The works are to be completed within seven years. Water-rates are to be deemed to be parochial or other local rates for the purposes of the Preferential Payments in Bankruptcy Act, 1888. Water-rates are to be payable in advance, the first payment becoming due at the time the supply is connected to the consumers' premises. Supplies may be by meter. Public drinking-fountains are to be gratuitously supplied. Owners of houses not provided with a proper and sufficient water supply are not to allow such premises to be occupied, under a penalty of £5 and £2 per day. Power is sought to establish a Thrift Fund for Corporation servants. The sum of £282,000 is to be borrowed for water-works purposes.

The Whitehaven Corporation Bill is to enable the Corporation to construct a new and enlarged weir on the River Ehen at the outfall of Ennerdale Lake. Certain powers of taking the water of the lake granted by an Act of 1885 are to be revived. The owners of the lake are to be protected. Owners are to be required to sell parts only of certain buildings and property to be purchased by the Corporation. The works are to be completed within five years. Metered supplies are to be charged at not exceeding 2s. per 1000 gallons. The sum of £15,000 is to be borrowed for water-works purposes, to be repayable in 60 years.

The Wishaw Water Bill is to enable the Commissioners of the borough to borrow £25,000 in order to complete certain water-works authorized by an Act of 1898, by which insufficient capital was allocated to the purpose.

The Wolverhampton Corporation Bill contains a clause to authorize the Corporation and the Bilston Urban District Council and the South Staffordshire Water-Works Company to enter into agreements relating to the supply of water to consumers within the urban districts of Coseley and Sedgley.

The Workington Corporation Water Bill is to authorize the taking over of the undertaking of the Cockermouth and Workington Joint Committee by the Corporation, for the supply of the borough. Additional works are proposed, including a pipe line from Crummock Water to a service reservoir in the parish of Stainburn Township, and weirs across the River Cocker. The works are to be completed within eight years. If by these works the level of Crummock Water should be raised so as to submerge any adjoining lands, the Corporation will compensate the owners. The rate for domestic supplies is to be 10 per cent. on rateable value. Special terms may be made for lock-up shops and empty houses. Metered supplies are to be charged at 1s. 6d. per 1000 gallons. The purchase of the shares of the Cockermouth Authorities in the joint water undertaking may be effected by notice before the year 1900. The sum of £110,000 is required for water-works purposes.

The Ayr Borough Bill contains a part relating to water-works and lands. A pumping station is to be constructed in the parish of Dalrymple, with a service reservoir at Knockjarder in the same parish. The works are to be completed in ten years. The powers conferred by an Act of 1885 for raising the water of Loch Finlas by 8 feet are to revived. The sum of £20,000 is to be borrowed for water-works purposes.

The Darwen Corporation Bill has a part relating to water. The Corporation propose to lay a new pipe line; and to take certain lands for the protection of their existing drainage area, which may be leased. Power is sought for dealing in fittings. Provisions are made for metered supplies. The Corporation desire to acquire additional lands for the purposes of the Act by purchase or on lease for not less than 500 years. The sum of £36,287 is to be borrowed for water-works purposes. Water-rates are to be placed within the operation of the Preferential Payments in Bankruptcy Act, 1888.

The above are all the pending Bills relating to water supply throughout Great Britain outside London. The water supply of the Metropolis is dealt with variously by a number of Bills, the main provisions of which are as follows:—

The East London Water-Works Company (Temporary Supply) Bill is to enable the Company, with the sanction of the Local Government Board, to take more water from the River Thames in cases of emergency, either by means of their own intakes or by those of other Metropolitan Companies. To this effect it is desired that temporary agreements between the Company and any other Metropolitan Company may be sanctioned. Generally, intercommunication as to supply among all the Companies is to be facilitated by this measure, the Company and any of the other Metropolitan Water Companies being authorized to apply their respective funds and revenues to this object. Any disputes under the Act are to be submitted to a single arbitrator acting under the Arbitration Act, 1889.

The West Middlesex Water Works Bill is to enable the Company, pending the completion of the Staines reservoirs, to draw further water from the River Thames in addition to the quantity of 24½ million gallons per day to which they are now entitled. This excess quantity is not to exceed 15 million gallons in any one day, nor an average of 5 million gallons per day in any half year; and is subject also to other conditions and to payments to the Thames Conservancy. Additional redeemable debenture stock to the amount of £250,000 is to be created and issued under the usual conditions applying to such issues. A new pipe line is to be laid down, from the Company's Hampton pumping station to Barnes, to be completed within five years.

The Metropolitan Water Companies Bill is a measure "for improving and facilitating intercommunication between the mains and works of the Metropolitan Water Companies. It provides that within six months from the passing of the Act, the Metropolitan Water Companies shall jointly prepare and settle and submit to the Local Government Board a statement describing the works and things which for obviating the possibility of a deficiency in times of drought or by reason of accident or in cases of emergency they may consider advisable for enabling one Company to assist the others. This is to be done under the inspection of the Local Government Board. The powers of the Companies to open streets and lay mains under the Water-Works Clauses Act, 1847, are to be extended to cover the objects of the Bill. The Companies are to facilitate the intercommunication of supplies; and the Local Government Board are to authorize, in cases of emergency, the taking of additional quantities of water from the River Thames. Any Company directed so to do by the Local Government Board are to increase their pumping power so as to give effect to the provisions of the Act. A standing or other arbitrator may be appointed to deal with any disputes arising under the terms of the Act. The sanctions of the Bill are made retrospective over the past year. Capital required for carrying out the purposes of the Bill is to be raised by the issue of debenture stocks of the different Companies, in amounts to be settled by the Local Government Board. Provision is made for the payment of the interest on the debenture stock expended by the Companies for one another.

The London Water (Finance) Bill is to authorize the London County Council to expend money on capital account in respect of the projects of the Council to acquire the undertakings of the Water Companies and bring in a a new and additional water supply from Wales. A special water fund is to be established by the Council, the capital to be provided by the creation of consolidated stock, redeemable in 100 years by a sinking fund to be commenced 15 years after the passing of the Act. The Consolidated Loans Fund is to be made applicable to this object, with the approval of the Treasury. The money required by the Council may also be raised by the creation and issue of a separate stock to be called "London Water Stock." The Bank of England may act as registrar of this stock for the payment of dividends. The money may also be raised by annuities.

The London Water (Purchase of Companies) Bill is to empower the London County Council to acquire the Companies' undertakings. The preamble is very long, setting forth that the water supply of the Metropolis ought to be in the hands of the County Council. The dates of compulsory purchase of the eight undertakings mentioned in the Bill are stated; and elaborate provisions are made for the appointment of the arbitrators. In determining the value of the undertakings, the arbitrators are to have regard to what is the fair and reasonable value of the property, including the cost of reinvestment, and to dispose of the reference according to their absolute and unfettered discretion and as fully and effectually as the same can be done by Act of Parliament. Power of inspection of the works is desired. The manner of dealing with the various debenture stocks is set out. The interests of the officers and servants of the Companies are safeguarded. The Staines Reservoirs Joint Committee are to be dissolved, and their property and powers vested in the Council. Temporary measures for effecting intercommunication between the distributing works of the different undertakings are to be sanctioned. The combined undertaking is to be managed by a Water Committee of 48 members, of whom one-eighth are to be appointed by the Corporation of the City of London and the remainder by the Council. As to extra-Metropolitan supplies, the various County Councils interested are to have powers to promote Bills for dealing with their part in the systems of supply. Otherwise these outlying Authorities are to have powers of purchase, leasing, or taking water in bulk as may suit them best. A special Water Fund is to be created. A schedule of the Bill shows the various Metropolitan water supply areas; the Companies originally authorized to supply them; and the manner in which Parliament has introduced and confirmed competitive powers of supply in London. The Acts of Parliament cited date from 1721 to 1884.

The London Water (Aqueducts and Works) Bill is to authorize the Council to make the necessary arrangements for conveying to and distributing in the Metropolitan area the additional water supply they propose to bring from Wales. The proposed works include a main aqueduct from a reservoir on the River Yrfon in Brecknockshire to a service reservoir at Boreham Wood in Herts. For this purpose, lands are to be acquired at Edgware and Hendon within seven years. The works are to be completed within 15 years. The capital outlay contemplated in the Bill is £13,250,000.

The London Water (Welsh Reservoirs and Works) Bill is to authorize the construction of reservoirs and works in Wales for the supply of water to London and the neighbourhood, at an estimated capital cost of £3,750,000. Twenty proposed works are included in the Bill; the reservoirs being on the Yrfon, Towy, Doethie, Upper Wye, and Chwefri streams. All these waters are to be taken, subject to the provision of compensation as stated in detail. Agreements may be entered into for the supply of water in bulk to local authorities.

The London County Council (General Powers) Bill is to alter the constitution of the Lea Conservancy Board, so as to admit the local authorities responsible for the preservation of the public health of the riparian districts.

THE VOELKER INCANDESCENT GAS-MANTLE.

HAVING now been favoured with the reports of Professor Vivian B. Lewes on the Voelker incandescent mantle, we supplement the article on the subject which appeared in our issue of the 14th inst. by reproducing them. It will be seen that the tests show that the mantles have a high lighting efficiency, though perhaps not quite to the extent ascribed to them by Mr. C. E. Masterman. The statements, however, as to the strength of the mantles and their power of sustaining their light-giving quality are corroborated; and some interesting experiments are given in the second report which go to prove that the lighting power is derived from the Voelkerite coating.

Professor Lewes's first report is dated Aug. 3, 1898; and it is as follows:—

In December last Mr. Voelker made a mantle in my laboratory according to his patent. The mantle consisted of a thoria core, coated with "Voelkerite"—a material made by fusing together lime, magnesia, and traces of chromic acid and ceria in an electric furnace. This mantle gave an initial illuminating power of 16 candles per cubic foot of gas consumed; and, after continuous burning for 3288 hours, still gave a light of 10·87 candles per cubic foot of gas. Shortly after this test, the mantle was destroyed by a breaking chimney.

In April last other mantles were made by the same process and of the same material, in presence of my assistant, and gave 14·6 candles per cubic foot of gas. After 500 hours, this had risen to 15 candles; the light then remaining constant for 1488 hours, and only fell to 14 candles per cubic foot after 2208 hours, when the mantle was accidentally broken.

These results are far superior to anything I have seen with other mantles, and show a greater strength and power of sustaining their light-giving powers than the Auer mantles.

The second report, which is dated three days later, is particularly interesting. It reads—

This mantle is made by making a pure thoria base, dipping it into an alcoholic solution of the material called by the inventor "Voelkerite," and igniting.

The composition of the Voelkerite is stated to be: Magnesia, 80 parts; lime, 20 parts; chromic acid, 0·88 part; and ceria, 0·6 part—these ingredients being fused together in an electric furnace, dissolved in the strongest nitric acid, allowed to crystallize, and the crystals dissolved in absolute alcohol to a 10 per cent. solution.

There is no doubt but that this process gives a strong mantle, having to a remarkable degree the power of retaining its light-giving properties; and the question which has now to be settled is whether it infringes the Welsbach patents.

I understand that Mr. Bousfield, Q.C., is clear as to there not being serious danger from the Welsbach patents of 1885, 1886, and 1887, but that there is a danger of its being found an infringement of the Moeller patent of 1893, unless it can be shown that the Voelker mantles owe their light-giving power to the coating of Voelkerite, and not to the ceria in the coating acting as an exciter to the thoria basis.

The following tests were made with the view of investigating this point. It is clear that if the illuminating power of the mantle is due to the Voelkerite alone, this material when used as a basis to a coating other than thoria should give approximately the same results as when used on a thoria skeleton.

A mantle was made by dipping a mantle cotton in a 20 per cent. solution of magnesia nitrate; and although the great shrinkage made it a very difficult task, two skeletons of this material were eventually obtained, and were twice dipped in the Voelkerite solution; being ignited between the dippings.

Mantle No. 1 (a bad shape).

Gas Pressure.	Gas Consumed.	Illuminating Power.	Candles per Foot.
12-10ths	5 c.f.	47 candles	9·4

Mantle No. 2 (slightly torn).

Gas Pressure.	Gas Consumed.	Illuminating Power.	Candles per Foot.
12-10ths	5 c f.	40 candles	8·0

These tests show that the Voelkerite has a very considerable illuminating power independent of the thoria base; and had it been possible to make the mantles of as good a shape as those obtained from thoria, the candle power would undoubtedly have been much higher.

A pure thoria mantle was next taken, and tested on the photometer for candle power, with the following results:—

Gas Pressure.	Gas Consumed.	Illuminating Power.	Candles per Foot.
12-10ths	4·5 c.f.	12·8 candles	2·8

It was then sprayed with a 2 per cent. solution of cerium nitrate; and after drying was again ignited, and tested photometrically, giving—

Gas Pressure.	Gas Consumed.	Illuminating Power.	Candles per Foot.
12-10ths	5 c.f.	5·5 candles	1·1

On determining the proportion of thoria and ceria present, ceria was found to the amount of 0·79 per cent. of the weight of the mantle. The explanation of the apparent anomaly of the ceria decreasing, rather than increasing, the candle power is that the ceria is all on the surface of the mantle; and although only present to the extent of 0·8 per cent. of the mantle, the combination on the surface is probably far higher.

A second pure thoria mantle was made by dissolving 1 part by weight of thoria in 3 parts of distilled water, dipping into it the mantle cotton, and burning off. This was then ignited, and gave on testing on the photometer the following results:—

Gas Pressure.	Gas Consumed.	Illuminating Power.	Candles per Foot.
12-10ths	4·8 c.f.	8 candles	1·7

It was then dipped in a 10 per cent. solution of Voelkerite, again ignited, and tested for illuminating value.

Gas Pressure.	Gas Consumed.	Illuminating Power.	Candles per Foot.
12-10ths	4·7 c.f.	39 candles	8·3

It is seen from these tests that the voelkerite on the surface of the thoria basis gave a result which was practically identical with the result yielded by the Voelkerite on the magnesia basis, and strongly upholds the contention that the thoria merely acts as a support, and gives the power of resisting the heat for a very long period, which the Voelkerite alone, or in a less stable combination, would be unable to do.

On analysis, the thoria mantle dipped in the Voelkerite was found to contain 20 per cent. of the latter material; but this only contains 0·6 per cent. of ceria, so that the total ceria present would only be 0·12 per cent. to the 80 per cent. of thoria.

Mantles were made of pure zirconia, and were then coated with the Voelkerite, but only gave an illuminating power of a little over 6 candles; this being probably due to the fact that there seemed to be an incipient fusion of the zirconia with probably the magnesia of the Voelkerite taking place.

From these experiments, I am of opinion that in the Voelker mantle, the effect produced is due to the Voelkerite, while the lasting properties are given to it by the thoria basis.

Subsequently (on Nov. 11) Professor Lewes further reported on experiments made with Voelkerite on a basis other than thoria, as follows:—

On taking a pure zirconia mantle, and testing its illuminating power, I obtained 9 candles for 5 cubic feet of gas, or 1·8 candles per foot. This mantle was then twice dipped in Voelkerite solution; and, on again testing, I obtained 30 candles for 4·75 cubic feet of gas, or 6·3 candles per cubic foot.

These results being lower than I expected, and knowing from experience that a zirconia basis will, in some cases, reduce the lighting effect in mantles, I next tried to make a mantle with pure magnesia; but the shrinkage was so excessive that 5 per cent. of zirconia had to be added to make it workable. A mantle composed of 95 per cent. magnesia and 5 per cent. zirconia was tested, and gave 5·8 candles for 5 cubic feet of gas, or 1·16 candles per cubic foot. It was then dipped in the Voelkerite solution; and, on again testing, gave 60 candles for 5 cubic feet, or 12 candles per cubic foot of gas.

These experiments clearly show that the Voelkerite when used as a coating to substances other than thoria still has a very valuable action in emitting light.

A fortnight later, Professor Lewes, in reply to an inquiry, wrote: "I am of opinion that the facts reported in my letter of the 11th inst., which show that Voelkerite, apart from a basis of thoria, still has a very valuable power of emitting light, prevent the Voelkerite mantle from being an infringement of the Welsbach patents."

OBITUARY.

We regret to announce the death last Tuesday, at Rhiwlas, Penmaenmawr, in his 72nd year, of Mr. JONAS DRAKE, who until a few years ago was head of the firm of Messrs. Jonas Drake and Son, of Ovenden, Halifax.

A very active and popular resident at Lewes has just passed away in the person of Alderman E. HILLMAN, who died last Tuesday, in his 72nd year, after a long illness. Deceased was by profession a solicitor, and for 35 years filled the position of Secretary and Solicitor to the Lewes Gas Company; vacating it about three years ago in favour of his son, Mr. Hubert J. Hillman. He was then invited to accept a seat on the Board. He was a Director of the Lewes Water Company, as well as of the Eastbourne Gas Company; and he was a member of the Corporation of the latter borough, and also of the East Sussex County Council. He became Mayor of Lewes in 1892; and was unanimously re-elected in the following year. Alderman Hillman was twice married; and he leaves a widow, two daughters, and six sons, one of whom is Coroner for Sussex.

PERSONAL.

The Directors of the Ipswich Gas Company have made a generous gift to the widow and family of the late Mr. R. F. PATERNOSTER, the Cashier and Chief Clerk.

Mr. THOMAS J. BUSH, Engineer of the Australian Gaslight Company, left Sydney in the *Himalaya*, on the 28th ult., on a visit to London, to inspect the latest improvements in the gas-works here and elsewhere.

Alderman W. W. CANNON, J.P., the Chairman of the Water Committee of the Bolton Corporation, has resigned the position owing to impaired health. Alderman Cannon is the "Father" of the Town Council.

An interesting feature of the recent half-yearly meeting of the Weymouth Consumers' Gas Company was the presentation to the Chairman, Mr. R. THOMAS, of his portrait in oils, in testimony of the shareholders' appreciation of his unceasing efforts for upwards of thirty years to promote the best interests of the Company. Mr. Thomas, in acknowledging the gift, sincerely thanked the proprietors for the compliment they had paid him, and asked the Directors to accept the portrait, and place it in the Board-room.

It will be seen elsewhere that we have devoted a greater amount of space than usual to our report of the meeting of the Barnet District Gas and Water Company. No excuse for this is necessary, seeing that it records what may be termed the public closing of the long and honourable career which Mr. ALFRED LASS has spent in the service of the gas industry. We greatly regret the cause which has brought about this severance from his public work, and sincerely hope that Mr. Lass will be spared for many years, with improved health, to enjoy the rest which he has so well and fully earned.

NOTES.

A History of the Coal Industry.

Mr. R. L. Galloway recently published, through the "Colliery Guardian" Company, a history of the British industry of coal mining and the coal trade. The author shows how, from small and almost accidental beginnings, this industry has risen to its present gigantic bulk, giving employment to something like three-quarters of a million of workers, and producing over 200 millions of coal annually. The first coal mining records are those of the great North of England field, where the seams cropped out on the hill sides. By the close of the sixteenth century, quarrying coal had generally given place to mining, which necessitated pumping. A century later saw the origin of the tramways for waggons with flanged wheels, which was the seed of the universal railway system. Still another century went to the invention of the steam-engine, which was first applied to unwatering collieries. Then came the discovery of smelting pig iron with coke, the introduction of coal gas, and the invention of the hot blast in iron making. Coal, iron, and gas waited upon one another; but it was only after the introduction of the safety lamp had made coal mining reasonably safe that the true age of steam began. Mr. Galloway has done enough to show that if at an earlier period the wool-sack was the fitting emblem of the source of English commercial prosperity, a more appropriate, if less luxurious, seat for the Lord Chancellors of the past hundred years would be a coal bag.

Labour-Saving Methods in Coke Manufacture.

Considerable developments of the Semet-Solvay coke-oven system are reported from the "New South" of the United States. Plant of the kind recently put into operation at Ensley, Alabama, illustrates the use of labour-saving appliances and dispositions, as favoured by the large scale of the installation. There are two parallel blocks of sixty ovens, with a gross output of 420 to 460 tons of coke per day. The coal is delivered in 30-ton trucks with sloping hopper bottoms; and one labourer can easily dump the whole day's supply into the bins, which have a capacity of 1500 tons. The charges are drawn from the bottom of the bins into lorries, and then dropped into the ovens. When coked, the charge is pushed out of the oven by a steam ram, and is quenched as it falls into a car placed to receive it. This car is 30 feet long and 7 feet wide, with a sloping bottom; and it is so arranged that the pushed-out coke lies on it in an even layer that permits complete quenching with a minimum resultant moisture in the coke. The coke-cars are moved by a wire rope and winding engine, and tip into a large bin from the sloping bottom of which the trucks are loaded for the furnaces. Thus the coke is moved but three times after it is quenched, until it lies in the furnace; and the breakage is reduced to a minimum. Coke-forks are rendered useless. Tar and ammonia are recovered, and worked up on the spot into marketable commodities. The surplus gas is to be used in a basic open hearth steel plant in course of erection. This will probably be the first direct manufacture of steel by the aid of coal gas.

The Nature of the Electric Spark.

It is a commonplace to say that we know little or nothing certain as to the true nature of the ordinary physical phenomena with the aspect of which we are perfectly familiar. Nothing, for example, is more familiar to everybody nowadays than the electric spark. Yet a very deep paper on the constitution of the electric spark, by Professor Arthur Schuster and Mr. G. Hemsalech, recently occupied the attention of the Royal Society. When a spark passes between metallic electrodes, the intervening space is filled with the vapour of the metals. But this is not all. The air itself is rendered luminous; and it was part of Schuster and Hemsalech's work to distinguish between the luminous particles of air and those of the metal poles. For this purpose, recourse was had to the method devised by Professor Harold Dixon for his researches into explosion waves. This method consists in fixing a photographic film round the rim of a rotating wheel. Were the sparks absolutely instantaneous, the images taken on the rotating wheel would be identical with those developed on a stationary plate; but on trial this is found not to be the case. The metal lines are found to be inclined and curved when the wheel rotates; and their inclination serves to measure the rate of diffusion of the metallic particles. The velocity of the volatilized metal is very great. What happens when the spark passes seems to be a discharge at first through air, which is intensely heated and rendered luminous; remaining so for a time. Then a mass of metallic vapours suddenly set free is driven by its own pressure into the partial vacuum formed by the heated air. The authors liken the process to that of gas under pressure flowing into a vacuum.

Tracking Wandering Electrical Current.

The exigencies of American city life at the present day have called out a new kind of specialist—the electrical engineer who is an expert in locating electrolytic damage to underground gas and water pipes. The first exponent of this order of *expertise* to come prominently before the American public was Mr. Knudson, whose studies of wandering electricity in New York were mentioned in these columns some time ago. It is reported in the "Engineering Record" that Mr. Knudson's services have been requisitioned for Jersey City, where the authorities suspected damage to their water-mains from the same cause. The result of Mr. Knudson's investigations was both surprising and disquieting. He began in a street where a trolley-wire tramway occupied the road surface, with a 36-inch main below, and at an average distance of 2 ft. 3 in. from the nearest rail. Here the difference of voltage showed that stray currents of considerable amount were passing from the rails to the pipe; but as the rails were positive to the main, it was the former that suffered from electrolysis. This was all very well; but the next task was to find out where the electricity quitted the main in its turn. This was looked for at a point where the main crosses a salt marsh on its way into the city, not very far from the tramway power station. It was expected that the salt dampness of the subsoil would offer a ready means of conducting away the electricity from the mains; and this was really found to be the case. Mr. Knudson reports that the condition of affairs at this point was such as if allowed to continue would have the effect of materially shortening the life of the water-mains. Measures were to be taken by the tramway authority to correct the mischief.

Midland Association of Gas Managers.—The annual general meeting of the Association will take place on Thursday, at the Grand Hotel, Birmingham. According to the programme issued by the Hon. Secretary (Mr. C. Meiklejohn, of Rugby), the only business will be the election of new members and the delivery of the Inaugural Address of Mr. J. S. Reeves, of Bilston.

"The 'Electrician' Electrical Trades Directory and Handbook for 1899," of which we have received a copy from the publisher (Mr. G. Tucker), bears evidence of considerable improvement in both the Directorial and the Handbook division. The additions to the latter include sheet tables, giving technical data and statistics relating to electricity for lighting, power, and traction in all parts of the country; while a sketch map, diagrams, &c., complete this statistical information up to the present month. The capital expenditure up to Dec. 31, 1898, is given of the principal electricity supply undertakings. This is the seventeenth year of publication; and each year the book increases in bulk, although its contents are limited strictly to matters of an electrical character. This time there is an addition of 80 pages; and the other new features are, besides the large extension of the sheet tables, a very full directory of directors of electrical companies, and data and statistics relating to electric traction. The Biographical Division contains sketches of the careers of upwards of 300 prominent electricians; many being accompanied by a recent portrait.

Municipal Trading.—A memorial has been addressed by the Council of the Society of Arts to the Home Secretary with regard to the increasing tendency of municipal and local authorities to embark in trading enterprises which may be in competition with, or to the exclusion of, private enterprise, and to the fact that as yet no limitations have been defined as to what enterprises should, in the general interests of the nation, be undertaken by Municipalities and Local Authorities, and what ought to be left to private effort. The Council ask the right hon. gentleman to advise Her Majesty to appoint a Royal Commission to consider the whole subject, and to lay down the principles and limitations on which parliamentary powers should be granted to Municipal and Local Authorities; and they submit that, until the report of the Commission, no further powers for trading purposes ought to be granted to such bodies. At the instance of the Liberty and Property Defence League, a petition to both Houses of Parliament on the same subject has been signed by railway, tramway, gas, engineering, electric light, water, &c., companies, by Chambers of Commerce, and by the Associations of employers, traders, property owners, and ratepayers throughout the United Kingdom.

The Case of the Water Supply of Philadelphia.—Not a very attractive picture of the results of municipalizing the water supply of Philadelphia, U.S.A., is given in the last published report of Mr. J. C. Trautwine, jun., head of the Water Bureau, to the local Councils. Here the surplus profits of the undertaking, to the amount of about a million dollars annually, go to the Local Authorities; and the Bureau cannot get any money to provide for extensions and repairs. Last year the condition of the city for water was well-nigh intolerable; this year it must be worse. Year after year the permanent officials have given warning of the needs of the undertaking; but all these appeals have been disregarded. The boilers and pumping-engines are strained to the utmost, and some are disabled. There is no opportunity for proper repairs. Pumping cannot be stopped during seasons of muddy water. The supply is sent out unfiltered; and from all sides come loud and well-grounded complaints from citizens who pay for a water supply but do not get it. The waste in the city is appalling; the quantity of water pumped every day being twice as much as is capable of being legitimately used. The introduction of meters to check this waste is strongly opposed. Money is not to be had for any purpose; and the whole undertaking is out of gear, and may break down at any moment. Such, as described by Mr. Trautwine, are the leading features of the great Philadelphia water supply undertaking, one of the largest on the American Continent; but unhappily under the control of Local Authorities who do not realize their responsibilities, and are permitted by a careless public to do as they please with the city properties.

TECHNICAL RECORD.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

The Twenty-Ninth Annual Meeting of the Institution was held at the Grand Hotel, Manchester, on Saturday last. On the members assembling shortly after 11 o'clock, omnibuses conveyed the party to the Gaythorn station of the Manchester Gas Department, where, under the guidance of Mr. G. Ernest Stevenson, the Corporation Gas Engineer, and Mr. J. Merrell, an inspection took place of the installation of coke conveying machinery applied to a range of inclined retorts. The arrangement here in operation was so recently described in connection with our report of the last autumn meeting of the Institution of Gas Engineers (see pp. 746, 756 of the "JOURNAL" for Oct. 4) that further details are unnecessary at the present time. It may, however, be said that the whole of the machinery was working with admirable smoothness on Saturday, and, in conjunction with the charging arrangements of the inclined retorts, engaged the attention of the members during the whole of the time they were able to give to the visit, apart from the other operations of the plant at the works. At the conclusion of the inspection, Mr. Haddock, on behalf of the Association, tendered to Mr. Alderman Bax, the Deputy-Chairman of the Gaythorn Station Sub-Committee of the General Gas Committee, the thanks of the members for allowing them the opportunity of being at the works; and the formal vote of thanks subsequently passed was duly acknowledged by Mr. Bax.

On the meeting being constituted for business after lunch at the Hotel—Mr. HADDOCK in the chair,

The HONORARY SECRETARY (Mr. S. S. Mellor, of Northwich) read the minutes of the Bradford meeting held in November last, which were duly confirmed.

THE LATE MR. ROBERT HUNTER.

The SECRETARY also read a letter from Mrs. Hunter expressing her sincere gratitude to the members for their kind message of condolence on her bereavement.

ELECTION OF NEW MEMBERS.

On the proposition of the SECRETARY, seconded by Mr. SHADBOLT, Mr. William Buckland, of Chesterfield, and Mr. Hubert Russell, of Holmfirth, were unanimously elected members of the Institution.

REPORT OF THE COMMITTEE AND STATEMENT OF ACCOUNTS.

The SECRETARY read the report of the Committee, congratulating the members on the continued prosperity of the Institution. During last year eleven new members were elected, two had resigned, two had died, and three had retired under Rule 17—leaving 134 members on the roll of the Institution. The Committee regretted to report that during the year the Institution had sustained severe loss by the death of two of its most valued members—Mr. W. Smith, of Hyde, and Mr. Robert Hunter, of Chester. Mr. Smith, it was remarked, was one of the founders of the Institution, and was most regular in his attendance at the meetings. In his capacity as Auditor, he had examined the accounts for the past fifteen years, with every satisfaction to the members. By the death of Mr. Hunter the Institution lost a member who regularly joined in the discussions at the meetings. He acted in the capacity of Honorary Secretary for a few years, and was a Past-President of the Institution.

The accounts accompanying the report were taken as read; and after some explanation as to certain of the items,

Mr. J. H. BREARLEY (Longwood) proposed, and Mr. G. S. FRITH (Frodsham) seconded their adoption, which was agreed to unanimously.

ELECTION OF OFFICE-BEARERS FOR 1899.

Mr. R. G. SHADBOLT, in proposing the election of Mr. G. E. Stevenson as Senior Vice-President, said it was most fitting that the Engineer of the Gas Department of the Manchester Corporation should be elected to this office in view of the title of the Institution.

Mr. H. HAWKINS (Todmorden) seconded the resolution. Mr. Stevenson, he said, would be the right man in the right place.

Mr. ISAAC CARR considered the Institution were especially indebted to Mr. Stevenson for the success of their recent meetings in Manchester.

The resolution having been carried,

Mr. STEVENSON, in thanking the members, said he wished he was able to devote more time to the Institution.

Mr. H. TOWNSEND (Wakefield) proposed the election of Mr. Chas. Wood, of Bradford, to the office of Junior Vice-President. Mr. Wood, he said, had been their host on three occasions at Bradford, and had placed the members under a deep debt of gratitude to him.

Mr. A. GRAHAM (Mansfield) seconded the resolution, which passed unanimously.

The PRESIDENT proposed the re-election of Mr. Newbigging as Treasurer.

Mr. J. WILKINSON (Drighlington), in seconding the motion, said in Yorkshire Mr. Newbigging was termed "The Father of the Institution."

The resolution having been carried,

Mr. NEWBIGGING, in returning thanks for the renewed confidence of the members, said there was no one who took a greater interest in the Institution than he did. He did not agree with the stereotyping of officials, but at the same time if they were determined to re-elect him to the post of Treasurer, he would fulfil it to the best of his ability.

Mr. S. MEUNIER (Stockport), in proposing the re-election of Mr. Mellor as Honorary Secretary, said a good Secretary was difficult to get. In their own Institution they happened to be blessed with a gentleman who was not only very willing, but very energetic, industrious, and able; and he certainly thought, as long as Mr. Mellor was willing to adorn the office, they could not improve on him.

Mr. J. E. HALL (Prescott) seconded the resolution, which was passed unanimously.

Mr. MELLOR briefly thanked the members.

Mr. F. H. PICKLES (Kildwick) proposed that Mr. Townsend should be elected on the Committee. He had great pleasure in proposing this, as Mr. Townsend had often come to their assistance in time of need.

Mr. R. MERRILL seconded the resolution, saying that Mr. Townsend would be a great acquisition to the Committee.

The resolution having passed unanimously,

Mr. TOWNSEND thanked the members.

Mr. G. W. LUPTON (Otley) proposed, and Mr. E. G. GRIMSHAW (Calverley) seconded, that Mr. William Carr, of Stalybridge, be elected on the Committee.

This resolution was also unanimously carried.

Mr. G. NIVEN (Cleckheaton) proposed that Messrs. Duxbury and Lamb be re-elected Auditors for the ensuing year.

Mr. H. KENDRICK (Stretford) seconded the resolution, which was passed unanimously.

Mr. DUXBURY, in returning thanks, expressed his sorrow at the death of his late colleague, Mr. Smith.

VOTES OF THANKS.

Mr. J. CHEW (Blackpool) proposed a vote of thanks to the Committee, the Secretary, and other officers for their services during the past year. He said the members were under a deep debt of gratitude to these gentlemen for their labours.

The resolution was carried by acclamation.

The PRESIDENT and SECRETARY returned thanks.

INTRODUCTION OF THE NEW PRESIDENT.

The PRESIDENT, in introducing Mr. R. G. Shadbolt as President for the ensuing year, wished to thank the members for the kind way in which they had supported him during his year of office, which kindness he was sure would be extended to his successor.

Mr. R. G. SHADBOLT then took the chair, and read his

INAUGURAL ADDRESS.

Gentlemen,—On rising to address you to-day, I must again ask you to accept my sincerest thanks for the honour you do me. Although naturally proud of such a distinction, I already find there is another side to the situation than that of personal gratification. It is certainly no light task to maintain what diplomats term the "*status quo*;" but when it comes to the guidance—however nominal that guidance may be—of an Institution so highly progressive, both in point of membership and quality of transactions, as ours, one feels his limitations and shortcomings as he never did before. The position, however, is not without its consoling feature; and this is to be found in the *personnel* of the Committee—formed as it is, both officers and members, of gentlemen of experience and energy, such as one can look to with certainty for advice and support. Given also the undivided assistance of members old and young, it inspires one with the belief that with a long pull, a strong pull, and a pull all together, we may make this—one of the closing years of the century—one of the most useful and successful in every sense of the terms.

In reviewing the district covered by our Institution, we find the manufacture and distribution of gas carried on under almost as diverse conditions as can well be conceived, although, taking the central and most thickly studded portion, the requirements are chiefly those of manufacturing towns. Still, taking the gas industry of the United Kingdom as a whole, it could not be better represented than by the district we cover. This being so, it would be manifestly unjust to occupy your time by much specializing; so with your kind indulgence I propose touching lightly upon those phases of our industry which present themselves the most readily to my mind.

Scarcely is there a department or branch of gas administration but can show some improvement and development of one kind or another—and that within comparatively recent times. In fact, the whole industry would at the present moment appear to be pregnant with life and energy. From the purely commercial point of view, our business may be said to show a steady, irresistible increase, such as justifies us in unshrinkingly facing our critics, and enables us to give an excellent account of our stewardship. That this is no mere sentimental boasting, a reference to that infallible witness the Board of Trade Returns will show. Briefly stated, the authorized gas undertakings of the United Kingdom have, during the last ten years—the time we ought, according to some prognosticators, to have occupied in the process of dissolution—increased their gas sales to the extent of 40 per cent.; while the increased profit from those sales

necessary to pay dividend and interest on the extra capital employed during the same period, stands at the ridiculously disproportionate figure of 7 per cent.

Yet some may ask: "How do we stand to-day compared with a more recent time than ten years ago?" The same reliable witness shall discover. The returns show that, comparing those bearing date 1898 with 1897, the increased sales of gas amount to 4·5 per cent.; and the increased amount placed to profit and loss account only 1·84 per cent.—a very similar state of affairs to that shown in the ten years comparison. This mode of expressing the advance made in the manufacture and distribution of gas will, of course, appeal most strongly to the commercial mind, and can also be understood by the man in the street. Indeed, any business or industry that is discharging its duty to the public in an equally efficient manner has every reason for self-satisfaction. The figures given above relate, as stated, to the whole of the authorized gas undertakings in the United Kingdom, of which we form no inconsiderable portion, as Lancashire and Yorkshire alone contribute 25 per cent. of the total gas made by those undertakings; and there is no doubt that the members of this Institution are well in the van, and contributing their full share to the rapid developments and improvements now taking place in the gas world. Albeit the commercial improvements effected are not due to chemical and engineering progress alone, for improved financing has also rendered valuable assistance. Anyhow, this combination has resulted in our providing the public with a gradually cheapening article, and rendering ourselves more and more indispensable in the process.

The chemical aspect of our operations is necessarily a fascinating one; and it may be taken as a sign of the times that the interest in, and study of, chemistry as affecting gas manufacture (equally with other manufactures) is spreading rapidly, and the old reproach of rule-of-thumb working will soon be completely removed. Rule of thumb, by the way, is no monopoly of the gas manager; nor was it ever so.

Surrounded as we are in our daily avocation by some of the most interesting changes, both chemical and physical, in the materials dealt with, it would be wonderful indeed if we did not develop the chemical side more fully. Opportunity is not given to all alike to acquire the laboratory training which is becoming more essential in the gas engineer every day. Still, there are many opportunities, even in the smallest works, of adding to our scanty store of knowledge, and, what is of still greater importance, the practical application of this knowledge from time to time.

No more fruitful field of labour and experiment can be found than the retort-house, especially in connection with the manipulation of fuel, thanks in a great measure to the advent of regenerative firing. This method of heating has been with us so long, and has become so firmly established, that we are in danger of looking upon it as the acme of perfection, and of imagining that no further improvement can be made. Whether this be correct or not, time will prove. Personally I am of opinion that further economies may be effected by such means as maintaining the fuel at one constant thickness, thus giving off a uniform supply of carbonic oxide. Also by the recuperation of waste gases from the settings, by means of which a certain amount of heat energy must be conserved. These two items alone are well worthy of attention, which can but result in benefits of one kind or another. Upon application to extended working conditions, the game may, of course, prove to be not worth the candle; but, so far as I am aware, it yet remains to be proved. Certain it is, from my own observations, that modifications, such as here indicated, are quite practicable.

Or as another direction for research, what can be more interesting—and at the same time more perplexing—than the process of condensation? As ordinarily carried out, the main if not the sole object is to reduce the temperature of the gas, in conjunction with sufficient surface contact or friction, to throw down or extract the tars, and incidentally the water vapours, contained in the crude gas. Close observation soon discloses the fact that the character of the gas, both chemical and physical, is not by any means constant under this treatment, and that too rapid cooling under certain conditions may bring about the transfer of some of the light-giving constituents of the gas to the tar-well, instead of to the gasholder. Further observation will disclose the action of condensed vapours upon those still in the gaseous form. In fact, condensation may be carried to such a pitch, under abnormal conditions, as to almost denude the gas of its light-giving properties. This is, indeed, a region where the experimentally inclined may explore to his heart's content; and the deeper he penetrates, the more will he find awaiting him. It is at this stage that enrichment in the generating plant may be rendered partially inefficient or be materially assisted; and I may perhaps be pardoned if I here interpose a few remarks on what has come to be known as the self-enrichment of gas.

As coiner of the term, it will possibly not be thought irrelevant if I attempt to define its meaning. Primarily it may be said to mean the utilization of some of the constituents of the gas in its earlier stages of manufacture, which under ordinary conditions would be lost—*i.e.*, so far as their retention in, and beneficial action upon, the finished gas is concerned—and, secondarily, the manipulation or method by which this end is attained. I must confess my inability to furnish you with a ready-made theory of what actually occurs during the process of self-enrichment. But that something of a beneficial character does occur, has been amply demonstrated; and I prefer to approach the subject from a severely practical, rather than a theoretical or mystical, standpoint.

As described in a paper submitted to the Eastern Counties Gas Managers' Association, in September, 1896, it was while experimenting from a theoretical point of view, that I was led on to what culminated in the self-enrichment process of to-day. The starting point was the returning of purified gas to the hydraulic main, with the idea of the more stable gas carrying some of the lighter hydrocarbon vapours forward, and thus running the gauntlet of condensation; and to further assist the returning purified gas in its mission, its vapour tension was temporarily raised by bringing the temperature up approximately to that of the foul gas. Yet, despite all allurements, the fickle vapours continued their downward career—absolutely refusing to be ensnared. Once possessed of the "returning" idea, it was not a great step from purified to semi-purified gas, in all its stages from the exhauster forward; and, having run this gamut, to vary the point of introduction of the returning gas within the limits of the ascension-pipe and exhauster inlet.

Without attempting to lead you through the vicissitudes of failure and success, suffice it to state simply the result of it all, which is that a certain proportion of gas, at that stage of condensation where the tar is practically removed but some of the lighter vapours remain—such, for instance, as would quickly stain white paper brown—returned to a point on the foul main where the temperature of the foul gas approximates to 130° Fahr., will give enriching results up to 1¾ candles. Indeed, under favourable conditions, an enrichment of 2 candles has been obtained—viz., from 17 to 19 candle power.

That this increased illuminating power should be obtained at the expense of something or other, is but rational; and on looking round, the effect was found to be on the condenser tars. These tars measured 1½ gallons per ton of coal carbonized; and the extent to which they were affected is shown by the following analyses:—

—	Per Cent. by Weight.		
	Without Self-Enrichment.	With Self-Enrichment	Loss due to Enrichment.
Water	1·90	1·74	—
Crude naphtha . . .	8·10	7·57	0·53
Light oil	9·26	7·26	2·00
Creosote	25·57	22·00	3·57
Anthracene and heavy oil	21·48	19·35	2·13
Pitch	33·00	41·30	—
Loss	0·69	0·78	—
	100·00	100·00	—

From these analyses, you will notice that the loss occasioned in the condenser tar by the self-enricher is chiefly in the oils and creosote. Consequently it is but fair to presume that these contribute towards the results obtained. Although no exact analysis has been made of the vapours contained in the returning gas, those condensable under ordinary conditions evidently contain a large proportion of benzol. Three gallons of this condensate, allowed to stand for a few weeks in contact with the atmosphere, separated out to heavy oil, water, naphthalene, and very light oil.

At the time the foregoing results and tests were obtained and made, we were carbonizing at Grantham under the direct-fired system, and working at what some would call comparatively low heats. But during 1898, gas-making operations were transferred to a new retort-house, with all settings on the regenerative principle; and a certain amount of speculation was indulged in as to how the self-enriching method would act when carbonizing at higher heats, and presumably under less favourable conditions. Subsequent events have, however, shown that results almost identical with those obtained previously may be secured under the altered conditions, by very little re-adjustment. Some 500 cubic feet more gas of fully 17-candle power has been obtained per ton of coal under the newer conditions and from the same class of coal as that previously used—viz., South Yorkshire. Valuable as are the enriching results obtained by this method, they are not the only advantages attending its use; for the experiences of others, as well as of myself, go to show that, properly applied, it is a certain cure for naphthalene troubles.

My own experience with it during this winter is very striking. The starting of the new retort-house previously mentioned put the self-enricher out of action; and owing to the thousand and one small items incidental to the situation, the enricher remained out of action until the winter season had well set in, and enrichment of some kind became necessary. Altogether it had been out of action from the early part of April until the beginning of November, when the necessary connections were again made and the enricher put to work. Scarcely had it come into action than naphthalene made its appearance, principally on the side of the district farthest from the works, and became very troublesome, particularly in those lamps fitted with incandescent burners. Examination of the enricher arrangements revealed the fact that the temperature of the foul gas at the point where the returning gas was introduced, instead of being 130° Fahr. as anticipated, ranged only from 100° Fahr. to 110° Fahr. Also the condition of the returning gas was not so oily as before. These

discrepancies were remedied by the 130° Fahr. point on the foul main being sought and found, and the returning gas taken from the washer inlet instead of the outlet. This adjustment soon had an appreciable effect upon the illuminating power of the gas; and in less than three weeks the naphthalene troubles had entirely ceased, and moreover have not appeared since. This in itself is sufficient to my mind to warrant attention; and I trust the time is not far distant when the precise conditions requisite, and the exact actions taking place during the self-enrichment of gas, will be thoroughly understood by all concerned.

The remaining processes—washing, scrubbing, and purifying, not to mention the extraction of the cyanides—are all equally interesting to the chemist in their respective spheres. As we discussed the question of purification generally so recently as our last meeting, the less said on this head perhaps the better, and I will confine my remarks to the last of these processes—viz., purifying; meaning the removal from the gas of all remaining impurities after treatment in the scrubbers, &c., and that of course with the least possible cost.

The intermingling of oxygen at the purifier inlet is a certain means of prolonging the life and increasing the duty of the material employed; but it appears to have gradually fallen into disuse—the cost of producing the oxygen being presumably the chief reason. Anyhow, many of us resort to mother atmosphere despite the deleterious effects of the preponderating nitrogen—and with great benefit, too. Time and observation have shown that the action of atmospheric air may be greatly accelerated by a certain humidity, which, of course, minimizes in turn the action of the nitrogen by reducing the quantity of air necessary to achieve a given result. The exact degree of humidity necessary has so far not been defined; and as our old foe naphthalene puts in an appearance immediately an excess of moisture occurs, the business of the experimentalist in this connection is clear—viz., to define the exact proportion of water vapour a gas may contain without bringing about the precipitation of naphthalene in the solid form. Once this is defined, even approximately, the only drawback to the use of steam and air in purifying will have been removed.

The amount of research and experiment necessary to adequately deal with the various chemical problems as they present themselves demands much more time and attention than is at the disposal of the busy manager; and in the larger works the chemist has become quite indispensable. But all kinds of considerations conspire to bar the chemist from the smaller ones. Doubtless as the average size of gas-works increases, this member of the staff will assume his proper place. Especially will this be so if the manufacture of water gas spreads to any great degree, and restrictions as to the proportion of carbonic oxide be imposed. Meanwhile, the managers of smaller undertakings are placed at a great disadvantage in this respect; and I throw it out as a suggestion that those of our members who are in the happy position of having a chemical assistant, do, when convenient and desirable, allow him to render assistance to their less fortunate *confrères*. Having myself been assisted in this way by a kindly neighbour, I assure you it is a favour highly appreciated.

To divert our attention from the domain of the chemist to the province of the engineer, is but the work of a moment; yet, momentary as it is, it serves to show the great versatility required of the gas engineer of to-day. Not only must he be a thorough business man and somewhat of a chemist, but he must also undertake the designing, constructing, and final control of the various plant and apparatus comprising his works. When visiting various works—especially of the larger type—as we are often privileged to do, how one is impressed at times with the dominating mind pervading the whole. In one instance, the impression will be that of general inadequacy, cramped, cabined, and confined in very deed; while in another it is like coming suddenly in contact with a refreshing breeze—capacity, ease of working, and a general sense of roominess and freedom, is depicted in every feature. These features are but the expressions of the guiding mind, which in turn is, to a very great extent, the product of his time.

If we pass over such items as the change in general design from the heavy ornamental, on the one hand, and plain flimsiness on the other, to a not unpleasant combination of form and utility, as expressed in most works of modern design, the principal feature and trend at present is certainly the increasing use of machinery in the handling of material. Fortunate indeed is the man whose works are of sufficient magnitude, and circumstances sufficiently propitious, to enable him, by the adoption of mechanical assistance, to minimize his dependency upon that most unstable of all factors the British workman.

Although machinery is in many instances utilized in such parts of the works as the purifying house, it is naturally in the retort-house, coal-store, and coke-floor that the greatest scope exists for its successful application. Whether it take the form of machinery for horizontal or inclined retorts, there are few instances but (with a works sufficiently large to keep it well employed, and the initial difficulties once surmounted) will show improved all-round working by its adoption. Still, the factors to be accounted for are so many, and of such diverse characters, that each engineer must carefully weigh the *pros* and *cons* before finally committing himself to its use. In fact, like any other innovation, a great amount of discrimination is called for; and unless some distinct gain is to be secured, the shovel or scoop will hold the sway in this particular case a little longer.

Until quite recently, there has been no intermediate appliance available between the shovel or scoop and the manual machine—such, for instance, as could be used without the aid of breaking and elevating machinery, or where the retort-house working-floor is restricted in width. I believe, however, that those of us in this intermediate state are about to find relief, for a very simple piece of mechanism is now being placed before us which entirely dispenses with the skilled charger, and from its action under prolonged trial would appear to be economical in working. It is simple and speedy, and promises to be useful in those works which are prohibited, from one reason or another, from participating in the use of any one of the various excellent mechanical appliances now in vogue.

But perhaps the boldest, and decidedly the most radical, attempt to eliminate manual labour from the retort-house, has emanated from within our own district, in the form of the revolving retort. Certainly no departure in gas manufacture was ever heralded in a more auspicious manner, or had before it a more promising outlook. Every attention was paid to the new arrival; and all kinds of wild visions were conjured up of the important part it was destined to play in our midst. Yet, brilliant as the outlook then was, at the present time failure is writ large upon it—at any rate to the superficial observer—and my excuse for calling your attention to what has erroneously come to be considered as a closed chapter in history is that the failure of this machine to effect its originally-intended purpose is no more certain than that the fascinating promises held out in the first instance have been assured.

It fell to my lot during the winter of 1896 7 to have placed at my disposal for testing purposes under every-day conditions a couple of these retorts, connected to a complete plant, with a view to ascertaining what might be expected of them in an ordinary way; and as these tests were to form the basis of negotiation between two other parties, every care was taken that nothing should be misstated one way or the other. Like most tests of this kind, hitches and stoppages of various sorts were the order of the day, and the longest run only extended to a little under three days. However, runs of sufficient length were made to demonstrate weaknesses and bring out difficulties that short trials would not reveal. The entire tests were carried out in three sets, the intervals being devoted to alterations and repairs; and as it is not my desire to weary you with a recital of the many difficulties encountered, I give below a summary of the results obtained in the first and second sets of tests, representing five runs in all of from 24 to 65 hours' duration each.

Product.	Yield.		
	Maximum.	Minimum.	Average.
Gas per ton of coal carbonized . .	8,878 c. ft.	5,557 c. ft.	7,223 c. ft.
Coke ash	14·39 cwt.	12·42 cwt.	12·83 cwt.
Tar	25·07 gals.	7·13 gals.*	18·15 gals.
Liquor 2° †	29·91 ,,	18·33 ,,	23·48 ,,
Pitchy deposit ‡	133·60 lbs.	36·44 lbs.	60·83 lbs.
Coke used as fuel			8·30 cwt.

* First run, apparatus dry. † No added water, and scrubber inefficient.
‡ Formed in hydraulic main.

At this stage it was discovered that the illuminating power of the gas was quite at the mercy of the exhauster. Variations of either pressure or pull—so slight as to pass unnoticed on an ordinary gauge—proved sufficient to expel gas or draw in air, as the case might be, through the coal in the feeding hopper. This having been remedied by means of double gas-tight hoppers, and slight alterations made in the furnaces, the third set of tests was conducted with greatly improved results—viz., 9580 cubic feet of 24-candle gas was obtained from similar coal to that used before, with a fuel consumption of 6½ cwt. of coke, as against 8·3 cwt. previously. Tar, liquor, and ash remained practically as before. The illuminating power during the first and second set of tests ranged between 16 and 20 candles, and was most erratic; while in the last set 24 candles was steadily maintained.

The two items which stand out more prominently than the rest in these tests—especially the first and second set—are the enormous quantity of coke consumed as fuel and the comparatively low yield of gas. Indeed, the most curious feature, apparent throughout, was that by altering the rate of coal-feed the yield of gas might be made to vary anywhere between 5000 and 10,000 cubic feet per ton of coal; the hourly output and illuminating power remaining fairly constant meanwhile. Undoubtedly heating difficulties were the immediate cause of this. As can be readily understood, the difficulties of heating a rotating vessel are much greater than those attending the ordinary system. Really no attempt worthy of the name had been made to meet the special requirements of the case, and as a result the greater part of the heat was dissipated; the method of applying it being such as to induce it to slip away past the sides of the retort, rather than to impringe upon the parts most in need of it. At any rate, such was the effect that not more than 4 tons of coal could be carbonized to anything like clean ash, as against 10 tons originally anticipated, per 24 hours. Less could not then be passed through as the gearing would not permit of it. Yet with this rate of feed the temperature of the retort would be lowered to almost a black heat at the feeding end within the first hour.

Little wonder that anything but satisfaction was felt under such adverse conditions, and that the position was further aggravated by equally adverse financial considerations. Such a combination of circumstances could not fail to stay all experiments, at least for a time. Briefly stated, the position is as follows: Certain definite, although erratic, results have been obtained. Increased quantities of gas have been secured; and still the illuminating power of the gas remains unaffected. Or, in other words, that point where increased quantity is obtained at the expense of quality has not been reached; and until it is, who can declare the system an absolute failure? This is one of those instances which incline one to agree with the proposal made every now and again to use our organizations for research purposes; providing works where departures of this kind could be tested under the best supervision, and in an impartial manner. The obstacles, however, are many; and it will doubtless be some time yet before anything of the kind is actually accomplished.

It is not a far cry from the retort-house to the coke-floor; yet the transfer of coke from one to the other is often beset with difficulties. We may congratulate ourselves upon the opportunity offered us to-day of inspecting one method of effecting its removal by mechanical means, designed specially to deal with conditions peculiar to inclined retorts. Ere long we may expect to find coke conveyors almost as plentiful as those for coal. The mechanical handling of materials before and after treatment is perfectly right and proper, where consistent with economy; but when it is extended to the disturbing of solid material during treatment, the result is certainly more enigmatical. For example, the devices put forward from time to time with a view to continuously moving and displacing solid purifying material. Here are encountered at the outset, conditions which must be religiously observed and maintained—viz., a state of quiescence, time-contact being a prime factor—and I am afraid that efforts to adopt mechanical motion in directions such as this will not always meet with unqualified success. Speaking broadly, and judging from the present general trend, one may fairly expect that, in the near future, almost all the operations, especially in works of larger size, will be conducted with that mechanical regularity and precision which is so essential to successful working.

Let us now turn our attention for a moment to that side of the business which brings us most in contact with our consumers. To say that the use of gas for purposes other than lighting is rapidly increasing, is simply to repeat a truism. Still there are those who need to be reminded of the fact. I do not purpose adding anything to the published records of the various popular means which conduce to this end—indeed, to attempt the addition of anything to the slot-meter question, for instance, after the excellent compilation of our President of twelve months ago, would be futile—but would rather direct your attention to the effect of these increased consumptions, especially that of the day output. The reflex action is such as to cause us ere long to revise our practice of pressure application. The larger undertakings find it necessary in some instances to carry high-pressure mains into the heart of the consuming district, and there distribute the gas at a suitable pressure. Those of us whose scenes of operations lay within more modest dimensions, though not called upon to project an artery of this kind, are nevertheless being compelled by force of circumstances to increase the day pressures of a few years ago. As instance the case of Grantham, where the day consumption may safely be classed as "domestic," as distinct from "manufacturing." Very few years ago, the orthodox 1-inch day pressure was considered ample; whereas now fully 15-10ths are required—not on account of small mains, but for the satisfactory use of various cooking, heating, &c., appliances. This would appear to indicate that, what with cookers, &c., in the day-time, and gas-fires at night, particularly in the winter season, a constant pressure will very shortly become imperative.

The call for gas for lighting purposes pure and simple, is, generally speaking, steadily tending upwards. Some undertakings, such as supply manufacturing districts, may at times suffer temporary checks from the inroads of electricity—more particularly where the arc light is adaptable, and a surplus power is at hand. But the incandescent electric light, considered as a light simply, cannot yet oust even the humble open gas-flame, much more the incandescent gas-light. Yet there are doubtless many cases where its use is preferred from reasons other than economy; and in the larger towns these instances often reach such proportions as to warrant its introduction. My own observations and inquiries on this point have led me to the conclusion that the use of electricity for lighting purposes is not at all governed by its comparative cost with gas, unless it be in inverse ratio to what might be expected; that there is a certain craze for it; that it is considered by the fashion leaders to be more up to date; and, perhaps not least, that it lends itself better to ornamentation. Anyhow, there are instances of this anomaly—where comparatively costly electricity and cheap gas flourish side by side.

All are aware that there is really no comparison, on the score of eithe rlight or economy, between the incandescent electric and incandescent gas lights; but they have one feature in common—they are delightful examples of a gradually diminishing quantity. Left to themselves, they slowly but surely assume the twilight stage, until, if the vital member be not replaced, you have difficulty in even locating them. So far as the incandescent gas-light is concerned, I believe many complaints of poor gas supply are traceable to it. Consumers have grown so accustomed to leaving gas-burners untouched for years at a time, that naturally the incandescent burner comes in for the same negligent treatment, with results disastrous to the suppliers of gas. As the mantles collapse from one cause or another, they are replaced, with grumble accompaniment; and the poor burner is left to burn its head off, or choke itself up. An instance of this kind came under my notice last winter. The proprietor of a pea-picking shed, lighted throughout with incandescent gas-burners, complained of the waning light. Upon inspection, the burners were found to be literally choked in the bunsen tube, as well as the gas-jets being almost webbed over. This was doubtless caused by the exceptional amount of fine dust in the atmosphere; yet it applies to a greater or lesser degree wherever the burners are neglected. In connection with our street lighting at Grantham, the standing orders are that every time a mantle is renewed, the burner shall be taken to pieces and cleaned. This averages with us five times a year.

The adaptability, with due care, of the incandescent burner to street lighting, has been so often demonstrated that it calls for little further comment. Let me say, in passing, that the high-power burners—such as the Denayrouze—give excellent results in lighting open spaces, and, light for light, cost about the same in maintenance as the smaller kinds.

Many of the members of this Institution are called upon to fill the post of secretary as well as that of engineer or manager, or both. To such, an exceptional opportunity presents itself to-day, in the form of the adjourned discussion on Mr. Brearley's paper on "The Balance-Sheet." This is a subject in which we are all of necessity deeply interested; and I trust it will receive at your hands that treatment it fully deserves.

From an administrative point of view, the gas industry never occupied such a sound position as it does to-day; and on the other hand, never were greater care and watchfulness required than at the present time. Those upon whom the administration of gas undertakings devolves, know full well that it behoves them to keep fully alive to every move on the board. To such, the so-called monopoly under which we labour is simply protection against irresponsible interference and unwarranted friction—that they may the better devote their full energies to the attainment of their one object, which is the provision of a medium of light, heat, and power in its best and cheapest form, consistent with due recompense from a master well served.

Time was, when the administrator, engineer, and manager had little in common. Gradually the respective duties have concentrated themselves, until now in many cases they have so blended as to become inseparably one, to the benefit of such undertakings. The reduction of official friction, and the unhindered operations of one guiding mind, are in themselves objects well worthy of attainment. This concentration, along with the higher *technique* of our business, demands that the competent gas engineer must be a resourceful and versatile individual—not a paragon of perfection by any means, but a highly trained specialist possessed of as much useful technical knowledge as is fairly possible to pack into the ordinary cranium. Add to this the lessons of experience, and you have the finished product.

Now it is to the educational side of Institutions such as this that I would draw your attention for a moment before concluding. One very gratifying indication of the growth of the desire for mutual technical education is the formation of the Manchester and District Junior Gas Association, which has certainly met a felt want in the junior ranks, and cannot fail to exert a beneficial influence in time to come upon our own and the National Institute. That they may go on and prosper is our sincere wish.

We congratulate ourselves upon the continually increasing number of members, and not altogether without reason. Yet there are many within the district covered by this Institution, who no doubt peruse our transactions, or such as appeal to them, but never dream of themselves contributing to the general good, even by their countenance. A brief survey of what may be termed our sphere of influence, brings one to the conclusion that our membership roll should be at least 200—not that we are touting for members by any means; but there are at least 50 more fully qualified men whose sense of responsibility to their profession, and a general desire to be of service, should be such as to include them in our ranks.

To go farther afield, we make the astounding discovery that out of 1600 gas undertakings, large and small, in the United Kingdom, only 600 are represented on the membership rolls of The Gas Institute and the Institution of Gas Engineers, allowing for those who are members of both. In all probability, those 600 go largely to form the 750 members who comprise the various District Associations and Institutions of the country. Here is scope indeed; and upon the younger members of this and kindred organizations rests the onus of improving matters. Our elders have played their part nobly and well, or we, as an individual Institution, should not be in the flourishing condition we are to-day; but there is work ahead, and work that is vital to the well-being of the industry itself.

The hand of death has laid heavily upon our older members lately; and we are deeply moved with regret at the losses thus sustained. Yet the world moves on; and we must do our part. Let the members of this Institution, old and young alike, but discharge their responsibilities faithfully and well, and I doubt not that we shall hand over to the century so nearly approaching, an Institution thoroughly suited to its purpose, and fitted in

every respect to meet whatever demands may be made upon it in the future.

Mr. W. W. Hutchinson (Barnsley) in proposing a vote of thanks to the President for his Address, said the keen up-to-date observation with which he had watched all processes put before the gas profession would commend itself to the meeting.

Mr. T. Bower (West Hartlepool) said they would all agree that the Committee in bringing forward Mr. Shadbolt as a Vice-President, and subsequently as President, had come to a very wise conclusion. From his personal experience of Mr. Shadbolt in the past, he could promise that during the coming year every attention would be paid to the duties and responsibilities appertaining to his office, and that the Institution would not regret having placed him in that position.

The resolution was passed unanimously.

The President, in responding, said he had admired the many presidential addresses he had listened to in the Institution, but he had never read one which gave him so little satisfaction as the one he had just delivered.

The Retiring President.

The President proposed that the heartiest thanks of the meeting be passed to Mr. Haddock for the services he had rendered to the Institution during the past year. Personally he felt indebted to Mr. Haddock for the assistance he had rendered him during his novitiate.

Mr. T. N. Ritson (Kendal) seconded the motion. He said the enormous amount of time, thought, and energy which Mr. Haddock had devoted to the interests of the Institution well merited the resolution they were asked to support.

The resolution having been passed unanimously,

Mr. Haddock returned thanks. His own feeling, he said, had been that he might have done a great deal better. If it had not been for the sympathy of the Committee, and the support of the members, he should not have been able to do even what he had done. He had tried to carry out his duties in a satisfactory manner, and only regretted that he had not been able to do so in a superior manner.

Adjourned Discussion on Mr. Brearley's Paper "The Balance-Sheet."

Mr. Brearley said one or two circumstances had transpired since he placed his paper before the Institution which might have led him to add something to the remarks he made at the previous meeting; and for the matter of that there were one or two statements which could be revised. But for the purpose of discussion it would be best for the members to have an opportunity of speaking on his remarks as first made.

Mr. Thomas Newbigging, in response to a call by the President, said if the remarks he was about to make should appear rather lengthy, he hoped they would bear with him as well as they could. The paper had touched on many points to which reference ought to be made in the discussion. He would endeavour to infuse some interest into what he proposed to say; and he did not think he should experience any trouble in doing this, because Mr. Brearley's style was infectious. In the first place, he wished to congratulate Mr. Brearley on having provided a fruitful topic for discussion in his paper on "The Balance-Sheet," read at the last meeting, and also on the ability displayed in its preparation at short notice. It was only within the last day or two that he had perused it. He had not the opportunity of attending the previous meeting, and therefore did not hear the paper read. When he first saw the title of the paper, he came to the conclusion (naturally, he thought) that the matter dealt with was one of book-keeping—a question as to the preparation and arrangement of the balance-sheet; of the items embraced in it, and how they might best be displayed in the most lucid manner. When, however, he perused the paper, he found that, so far from its being merely a question of book-keeping or accountancy, it really opened up the very wide subject of the whole administration of gas undertakings, both those in the hands of companies and those owned by local authorities. After all, therefore, there might be a good deal in a name. The rose would no doubt smell as sweet by any other name; but they might be excused for misapprehending the subject of Mr. Brearley's paper on "The Balance-Sheet," when he in reality meant "The Administration of Gas Undertakings as Exhibited in the Figures of the Balance-Sheet." However, a question of title was a comparatively small matter. There was the fact that a very wide and comprehensive subject was suggested for their consideration and discussion. The first point alluded to in the paper was that of the capital relatively to the quantity of gas sold. It was not to be expected that there should be uniformity in this figure throughout the country. It varied, and it would vary; and the causes were not far to seek. He had dealt with them at some length in another place; and it would be as well, in order to round off this discussion, to briefly refer to them now. The cost of incorporation, as had been pointed out, where there had been strong and expensive opposition to encounter, bore heavily on some works, especially small ones. Then there was the cost of land, which varied considerably. The cost of erection of works was often increased by the character of the subsoil. He knew, for example, of a works in Yorkshire, not very far from Longwood, where as much, or more, capital had to be sunk in foundations than in the superstructures. It might well be here retorted that the selection of such a site showed bad judgment. That might or might not be so. If no better site was available, then the expenditure was a necessity. Again, the nature of districts of supply varied a good deal. Some companies had a close and compact area—a town population almost exclusively. Others had wide and straggling semi-rural districts, requiring long lengths of mains largely unproductive. The cost incurred in distributing plant in these respective cases must vary to a considerable extent. Then it made a difference in the relative capital expenditure as between a place where a large proportion of the plant had to lie idle during a good part of the year, and another where there was a fairly steady consumption by all the consumers all the year round, or where, as in popular watering places, they had two heavy consuming seasons in each year. There was a further thing which went far towards accounting for the relative difference—that was, where a company were working up to the hilt as regarded their producing, storing, and distributing capabilities. It was evident that in such a case the capital per million cubic feet would for the time being be low. But let the company carry out the necessary extensions—and such extensions must always be larger than immediate needs—and it would be found that the capital per million cubic feet would go up at once. If besides these things they took into account the bad and wasteful engineering that some gas undertakings had suffered from, in badly designed works—immediately an extension was required, a large portion of the existing buildings and plant having to be displaced at a sacrifice—they would be able to appreciate why there should be such a difference, relatively, between one gas company and another as regards the capital per million cubic feet. But take the average capital of the companies throughout the United Kingdom, and it would be found that for the year 1897 it amounted to £659 per million cubic feet of gas sold. Ten years before (in 1887) it was £665; and fifteen years before (in 1882) it was £724. So that there was a gradual reduction taking place in the average. He had purposely left out of the calculation the corporate undertakings, because the figures in these cases were vitiated by the premiums paid on taking over a concern from a company. It might also be pointed out in this connection that in established gas-works the future complete extensions could be carried out at a cost of £350 to £500 per million cubic feet of gas sold—the rate depending on the size of the works. So much for the capital per million. He agreed with the writer of the paper on the great lack of lucidity and simplicity in the accounts of some corporate undertakings. They seemed to be compiled with a view, not to reveal the inner working of affairs, but to cloak and confuse the actual results as far as possible. This, in his opinion, did not arise from any intention to hide matters; it was really only an indication of the want of a systematic and methodical mind at the helm of affairs. He used the word "helm" advisedly, because nothing contributed so much to things getting adrift as the lack of a good, competent, clever man at the financial rudder. He thoroughly endorsed the view of the writer of the paper on the rating question. Many gas-works were grossly over-assessed. Assessment Committees persistently refused relief; and Quarter Sessions, against whose decision there was no appeal, unless it be on a point of law, were far from being a satisfactory tribunal to try cases of this kind. A revision of the method of rating was much needed. Mr. Brearley expressed the opinion—with which most or all of them would be ready to agree—that where the local authority had control of the gas supply, the consumers should not be fleeced on behalf of the rates, in addition to providing a sinking fund to redeem the capital. The extent to which this unfair policy was carried out had been moderated of recent years, and should be entirely discarded. In Manchester, not so very long ago, the gas consumers were severely handicapped (not to use a stronger expression) by reason of the policy that was pursued, and the system of accounts employed. In the accounts there was the usual sinking fund for the redemption of capital; there was, in addition, what was called a depreciation fund, notwithstanding that wear and tear and renewals were charged to revenue; and, to crown all, the public lighting was supplied free, and huge sums in addition from the gas profits were credited to the general fund in reduction of rates. Like Issachar, the strong ass, the gas consumer crouched down between, not two burdens, as the scripture had it, but under a multiplicity of burdens. [By the way, Issachar was, he remarked, not intended as a pun on the name of his friend Isaac Carr, as some might be inclined to suppose. He revolted against his *one* burden, and managed eventually to kick it off.] Well, those were the days in Manchester when administrative ability and scrupulous finance were scarce and dear, and the flesh and blood of gas consumers was cheap. Happily, an amelioration in these respects had taken place of late years under the enlightened policy of the present Chairman of the Gas Committee and Mr. Nickson, not to mention Mr. G. E. Stevenson. But there was room for still further improvement even in Manchester. The writer of the paper referred to what he considered the anomalous position which statutory gas companies held in not being able, owing to parliamentary obligations, to effect a reduction of capital. There was really no hardship in this—as a matter of fact, there would be a hardship in being compelled to do it. No company could possibly, or would seek to, gradually wipe out their capital. How could they? The only effectual way of doing it would be to adopt the method which was deprecated—namely, to burden the present generation of consumers for the benefit of the consumers of a future time. The capital—that was, the shares or

stock—was bound to remain unredeemed, and, indeed, to be increased as required for extended business. If it were otherwise, it would not be a company at all, but a mere financial snowball, melting away under the rays of the sun of prosperity. All stimulus to enterprise would utterly vanish. It had only to be looked at, to see that such a principle would be entirely wrong. It was sufficient to take care that the property—that was, the buildings, apparatus, and plant—was kept scrupulously up to its proper value by charging the full wear and tear and renewals against revenue year by year. The effect of the auction clauses, now introduced into all Gas Acts, was virtually to prevent the growth of an inflated capital. Even in the case of corporate gas-works, it was questionable policy to go on wiping out the capital—most certainly it was wrong to insist, as the Government Departments did, on repayment within the brief intervals of twenty to thirty years. The gas industry was not a moribund industry—who among them believed that? On the contrary, it was very much alive—never more alive than at the present time. The way to handicap it, however, was to insist on burdening the present consumers to redeem the capital at short terms for the benefit of posterity. Corporate gas committees, managers, and secretaries should look closely into and study this question. It was well worth their attention. On the question of the cost of wear and tear and renewals, Mr. Brearley had something to say. His contention was that 3d. or 3½d. covered the cost of these, as against 5d. usually adopted by the experts.* In this, however, Mr. Brearley laboured under a grave misapprehension. The 5d. of the experts—which he (Mr. Newbigging) contended was about right—included the repairs, maintenance, and renewals of mains and meters, as well as works proper, and if Mr. Brearley would add the cost of repairs and renewals of mains and meters to his 3d. or 3½d., he would find that the figure of the experts was a proper one. That was to say, it required on the average 5d. per 1000 cubic feet of gas sold to repair and maintain works, mains, and meters, and to reproduce them when worn out. As a matter of fact, he had taken the trouble to work out the cost of repairs and renewals of works, mains, and meters; and it came to a fraction over 5d. per 1000 cubic feet of gas sold. It was to be wished, therefore, that the paper might be corrected in this particular by deleting, or by altering, the paragraph dealing with this question. The poor experts, he observed, often come in for a share of scarcely deserved obloquy, either by open word or innuendo. In his opinion, their fees were earned very hardly, and they richly deserved what fees they got. Theirs was anxious and responsible work—none more so. To qualify themselves, they had to serve a long, and often weary, apprenticeship for but scant remuneration; and, next to barristers, their brains were continually on the rack. He supposed if their services could be dispensed with, they would not be employed. No doubt they were like the family doctor—one did not like to see his carriage at the door too often, but the service they, like him, were able to render, was not to be despised. One thing he knew—their clients were often richer by many thousands of pounds than they would otherwise be, by reason of the experts' devotion to their clients' interest. In conclusion, he was glad that Mr. Brearley had brought before them a subject that gave plenty of scope for thought and discussion. His example should inspire and encourage the younger members of the Institution to come forward with papers. There was no subject, however much it might have been threshed out, but could be presented in a new and unexpected light; and every process of gas manufacture and detail of gas administration would still bear the weight of many papers and discussions.

Mr. Isaac Carr (Widnes) said there was much in the paper which commended itself to him. The question of municipal management was one that he had himself dealt with; and he quite agreed with Mr. Newbigging that the way in which many towns were treated in this respect was a great shame. They could derive some satisfaction from the fact that the bygone colossal amounts which had been taken were gradually being reduced; and he thought they could look to the healthy competition of electric lighting to bring them down still further. In time to come they might be given up, not only in justice to the consumers, but through sheer force of circumstances. He was quite sure that the gas industry of the future must rest on its own basis, and that it could not go on carrying other loads besides its own. With regard to the cost of maintenance mentioned in the paper, he had looked down the figures with some degree of interest, and was much more inclined to throw in his lot with Mr. Brearley than with Mr. Newbigging. The latter gentleman talked of 5d. as a proper figure, and one which might be useful in rating appeals. But however useful it might be in this respect, while it was right and proper to spend a sufficient amount on works, he contended that in the average works, such as those of which he had knowledge, the charge of 5d. for maintenance was too high.

Mr. Newbigging said this figure covered both maintenance and renewals.

Mr. Carr said many of his colleagues had charged him with not maintaining his works properly because his figure for maintenance, renewals, &c., was a remarkably low one. His reply was that if he was not maintaining the works properly they would suffer and tumble down; and the fact that they were well kept up, that the whole of the plant was good and sound, and that the necessary repairs were annually executed at the figure he adopted, was a sufficient justification for its adoption.

Mr. Newbigging said Mr. Brearley limited his 3½d. to works only, and did not include mains.

Mr. Carr said, whichever way it was taken, in his opinion the figure of 5d. was too high. Passing on to the question of capital, he said a remarkable lesson was to be gathered from the table Mr. Brearley was good enough to put before them, showing amounts varying from something over £1000 to £330 per million cubic feet sold. Of course, as Mr. Newbigging had very properly told them, local conditions affected the cost of works; and besides this there were engineers who had very old-fashioned and extravagant ideas. The day for such ideas had gone, and it was no longer possible to lay out on the construction of works the money formerly expended on them. He did not want to talk too much about himself; but, as an instance, he would say that he had recently reconstructed the works at Widnes, and they were capable of producing double the quantity of gas they were selling at the present time, while their capital per million cubic feet, working up to half their capacity, was almost the minimum figure given by Mr. Brearley. He was personally indebted to that gentleman for having brought the subject forward in the able manner he had done, as it was one which appealed to all of them. He thought the suggestion to which reference had been made, that gas engineers had nothing to do with the balance-sheet, was rather far-fetched, because he could not understand how the matters contained in the paper could be separated from gas-works management.

Mr. H. Townsend (Wakefield) said he had been anticipated in a great deal of what he wished to say. He had noticed the fact that Mr. Brearley's figure of 3½d. did not include the repairs of mains, services, and meters. He was rather grieved to see the figure stated in such unequivocal terms, because if Mr. Brearley should have the misfortune to have his assessment put up, he might find his figure brought up in evidence against him, and be rather difficult to refute. He (Mr. Townsend) was glad Mr. Newbigging had drawn attention to this; and he wished to emphasize what that gentleman had said. As he read it, the item of repairs and renewals was not so much what was actually spent as what ought to be spent. The whole system of rating was hypothetical; and he agreed with Mr. Newbigging that 5d. was the least at which ordinary gas-works could be maintained.

Mr. Newbigging remarked that this was the actual average figure throughout the country.

Mr. Townsend said Mr. Brearley stated that "any undertaking whose Special Act incorporates with it the Gas-Works Clauses Act of 1871, is, according to clause 35 of the latter, liable to a penalty of not less than £2 per day so long as the accounts are not made out in compliance with the particulars specified in Schedule B annexed to that Act. This schedule clearly interprets that new meters not in place of old ones should be charged to capital." He had read the Act very carefully to see if he could attach that meaning to it, but had failed to do so. He believed such a meaning had been sustained in the Courts, although it did not seem to be in accordance with the Act. He read it as meaning that this section really related to the facilities which were to be afforded to the public authority to examine the company's balance-sheets; and the penalty seemed to apply exclusively to any failure to send the balance-sheet. It sometimes happened that a company under the sliding-scale who were entitled to pay a certain dividend, and a little higher one on reducing the price of gas, did not declare that dividend, but, as they were entitled by law to do, placed the amount to the credit of the reserve fund. Supposing a company were unable to get any but very expensive capital, and in order to keep it down, charged to revenue a certain amount for new meters, the only people to benefit were the consumers—perhaps not at that particular date, but in the future; and the present consumers could not complain because the company were entitled to pay an extra dividend. It seemed very hard, if it were the law, that they were penalized in the way stated by Mr. Brearley. Supposing a company wanted to modernize some antiquated plant, for portions only of it ought the charge to be placed to capital; the other portions should certainly be charged to revenue. But in cases of this sort, it very often happened that the amount which clearly belonged to revenue would be sufficient to swamp the profit made for that half year. In circumstances such as these, several reputable companies had placed the sum to a suspense account, and paid it off out of future profits. He had looked very carefully through Schedule B, and saw no mention of a suspense account; so that, according to Mr. Brearley, those companies who were carrying out their obligations in a legitimate manner would be liable to a penalty of £2 a day. Some companies were in the habit of paying their dividends clear of income-tax; whereas in "Michael and Will" it was stated that the income-tax must not be paid in addition to the prescribed rate of dividend. He sought in vain in this authority to find out what the prescribed rate of dividend was

* In regard to this remark, we learn from Mr. Brearley that this particular portion of his paper was struck out after the MS. was in type for the Bradford meeting, and before the paper appeared in our issue for Nov. 29. By some inadvertence, however, the lines were replaced in the Institution's official report and in the slips which were handed to the members preparatory to the discussion on Saturday. Mr. Brearley, on this subject, writes: "As I did not go through the reprints last week, I could not, even if I had desired, correct Mr. Newbigging's misapprehension, as I could not feel absolutely certain until I had looked the matter up. I had, previous to the Bradford meeting, been made aware of the items included by experts in getting out repairs of works rate."

in the case of a company working under the sliding-scale. Did it include the amount paid over and above the standard dividend which was allotted by the sliding-scale? Supposing they were entitled to a certain dividend, and as in the case he had instanced, they did not declare it, were they then entitled to pay their dividend clear of income-tax?

Mr. NEWBIGGING: Yes.

Mr. TOWNSEND said he was very pleased to hear it. He concluded by thanking Mr. Brearley for his interesting paper.

Mr. W. WHATMOUGH (Heywood) referred to Mr. Brearley's remark that, generally speaking, the accounts afforded a rough idea of the stability or otherwise of the financial side of the undertaking, and that this stability was more apparent than real. This, according to his experience, was certainly the case with corporate undertakings. In his own case, when the works were bought by the Local Authority, the share capital was £30,000, and annuities at the rate of 10½ and 7½ per cent. were granted. This appeared in the balance-sheet as an item of £30,000; and it remained so till the year 1881, when the capital account was raised to £62,500, although the interest on the capital was the same. In 1897, the annuities were converted into stock; and the purchase was effected on a 3 per cent. basis, which really put up the capital £20,800 more. Thus, strictly speaking, their capital appeared at £53,300 more than it did when the concern was purchased. The rate per million cubic feet sold worked out at £1280, whereas it was only £774 on the original basis. With reference to the question of the valuation of gas-works, which had been referred to by Mr. Newbigging, he thought some united action ought to be taken. There was no doubt that some works were very heavily assessed; and if the Manchester and kindred Institutions were to combine in obtaining legislation to remedy the evil, it would be of immense advantage.

The PRESIDENT said the whole question, to his mind, apart from the amount originally expended as capital in putting down a works, resolved itself into this: What should they charge to capital and what to revenue? Each undertaking had to depend on its own circumstances and conditions.

Mr. BREARLEY, in reply, thanked the members for the kind remarks made respecting his paper, and for the way in which it had been discussed. He agreed with Mr. Newbigging that the title of the paper was rather misleading; but he must crave the indulgence of the members in this respect, as the time in which he had to consider either title or paper was very limited. He quite agreed with what Mr. Newbigging had said about Quarter Sessions, and that taxing gas to relieve rates was an injustice. He also concurred in what that gentleman had stated about the Local Government Board; and if he were in the unhappy position of being an expert, he should strongly recommend a corporation to go to Parliament for their borrowing powers. If his paper were read through, it would be seen that he did not deal with the question of repairs to mains and meters. His rate of 3½d. simply covered the maintenance of works, and not the rate which the experts got out when a transfer took place. Mr. Newbigging had found that the rate was over 5d. But in all probability there were large sums placed to revenue which ought to go to capital for things that were not legitimate repairs. New meters and new works were put into revenue instead of being capitalized; and it was this that swelled the figure up to 5d. He congratulated Mr. Isaac Carr on the remarkably low rate appertaining at Widnes. He thought that Mr. Townsend's remarks were somewhat beside the question. A company paying extreme dividends ought not to put items to revenue which should be capitalized. In that case the company should reduce the price of gas. Schedule B of the Gas-Works Clauses Act should be read in the spirit intended—viz., that all items not for renewals should be placed to capital. He quite agreed as to the necessity for a suspense account when altering large works; and no doubt the reason such an account was not mentioned in Schedule B was because Parliament did not then realize that large amounts might be required for renewals in one year. He concluded by again thanking the members for their reception of his paper.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

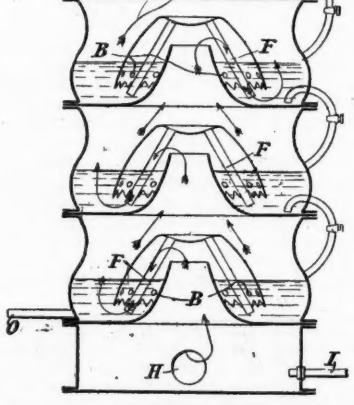
The Monthly Meeting of the above Association was held last Saturday. In the afternoon a visit was paid to the meter-works of Messrs. Sawer and Purves (a branch of Meters Limited) at Miles Platting, where the members were kindly received by Mr. Mercer (the Manager), and Messrs. Butterworth, Robinson, and Mackensie, who conducted the party over the establishment. The works as a whole seemed to be of modern design, and fully equipped for dealing with large orders in an efficient manner—the manufacture of meters throughout, from crude material to finished article, being carried on. The shops are well lighted; and consideration for the comfort of the employees is shown in the elaborate system of ventilation, both mechanical and natural. The prepayment meter room was first visited; and, a large number of meters being in course of construction, the members had an opportunity of examining the various parts at different stages of manufacture. The dry and wet meter rooms were also well equipped, and seemed to be fully employed. The testing-room was considered one of the most interesting departments; there being large provision for the testing of all kinds of meters with the latest and most satisfactory appliances. The foundry and other shops having been inspected, the party were conducted to the office, where refreshments were provided. Opportunity was taken of passing a vote of thanks to the above-named gentlemen, which was acknowledged by Mr. Robinson, on behalf of his colleagues and himself.

In the evening, the members met at their rooms to hear a paper by Mr. Wild on "Stopped Ascension-Pipes." The author remarked that stopped pipes constituted one of the many evils tending to make the life of the gas engineer anything but one of ease and comfort; and when this trouble existed to a large extent, as was often the case, he was obliged to do something to mitigate the evil, or soon it would have a disastrous effect on his make of gas per ton of coal, as well as on the profits, &c. He next mentioned some of the theories brought forward as to the cause of the trouble and the way to remedy it; among which was this: The gas at the latter part of charge, being very dry, caused the sooty matter adhering to the sides of the pipe to cake, and gradually block up the pipe. In this case the prescribed remedy was to keep the interior of the pipes moist; and several arrangements had been devised with a view of accomplishing this object. It was contended that this method also kept the temperature of the pipes low; very hot ascension-pipes being generally supposed to be conducive to the production of stoppages. The results obtained from the experiments made, the author said, did not justify the adoption of this as an unfailing remedy. Another advantage claimed was the use of coal perfectly free from dust, as the particles were carried up along with the gas and deposited on the interior of the pipes. The author next remarked on the uneven heating of the retorts, often due to imperfectly designed settings; the commonest fault being the variations in the heat of the different retorts—the centre and two middle side retorts getting much hotter than those in the other part of the setting. The effort to maintain these at the proper heat for carbonizing caused the others to become far too hot for the weight of coal employed. It was contended by some engineers that the chief cause of the trouble was the hydraulic main; and they accordingly advocated the use of a dry main as the only means whereby the evil could be overcome. Mr. Wild next stated that, with the view of reducing as far as possible the number of causes of stoppages in the ascension and arch pipes, and also of facilitating the removal of the obstruction, it was necessary, when designing this class of work, to pay particular attention to the following details: Provision should be made for covers or plugs (which were the best) of large diameter to the arch pipe; and if plugs were used, there should be at least two to each arch-pipe—one to allow the pipe to be cleaned, the other to enable the ascension-pipe to be properly "jumped." A good discussion followed the paper—most of the members taking part therein; and a hearty vote of thanks to Mr. Wild brought the proceedings to a close.

REGISTER OF PATENTS.

Extracting Cyanogen from Coal and Coke-Oven Gas.—Farmer, W. J., of Eastcheap, E.C., and Somerville, J. M., of Farnborough. No. 4410; Feb. 22, 1898.

The patentees point out that, in processes hitherto employed for the recovery or extraction of cyanogen compounds existing in gases, it has been the practice to effect the recovery or extraction after the extraction of the tar, ammonia, and other products; but their improvements are specially designed for the purpose of enabling such extraction to precede



that of the tar, ammonia, and benzene compounds, "without the removal in any appreciable quantities of the hydrocarbon and ammonia gases existing in the crude products of the retorts or ovens."

For this purpose, they propose the use of a ferrous hydrate salt in a fine state of division, mixed with carbonate of soda (in the commercial form

of soda ash) in the proportion by weight of 1½ parts of iron salt to 1 part of soda ash and 14 parts of water. The solution of suspended salt is worked up in a heated mixing-tank, designed with a view to the rapid removal of any coarse sediment contained in either of the materials, and for the decanting of the solution into the mechanical extractor, which is preferably arranged as part of the mixing-tank. The gas is compelled to churn the solution in its passage through the apparatus, so as to prevent the suspended salt settling.

As shown, the extractor comprises a series of trays containing the solution or mixture to such a depth as to seal the perforations B in the sides of an inner chamber or dome, arranged as an inverted trough with concave top. The under sides of the trays are curved; and the gas passing into the interior of the inverted trough forces the solution within to the outside, in order to escape through the perforations, and in so doing creates a churning action and produces foam. In order to promote the continuity of this action, pipes F are led downwards at certain points in the hollow cover of the trough; and the liquid thrown on the concave top of the cover, through the churning action, is thus conveyed to the interior.

The trays are jointed together and to a base chamber containing the gas-inlet orifice H and steam-pipe I; and they are surmounted by a mixing chamber containing the salt solution, which is agitated by any suitable means to prevent the deposit of the suspended matter. The spent solution is drawn off through a pipe.

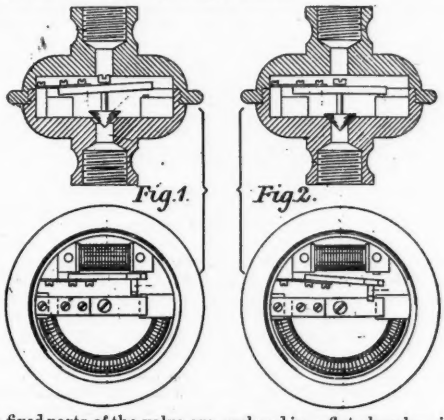
Steam and gas having been admitted at I and H, they pass through the curved centre of the bottom tray down beneath the dome and through the solution, and so on through the remaining trays, and out through the outlet P. The temperature of the solution is maintained at about 140° Fahr., as it is found that "at such a temperature ammonium salts do not form in the presence of carbonate of soda, that the absorption of sulphuretted hydrogen by liquor heated to such a degree is considerably diminished, and that the hydrocarbon compounds are to a great extent unaltered."

When the liquor has absorbed cyanogen compounds in sufficient quantity, it is run off to a settling-tank, and (after being filtered) evaporated down to one-third of its bulk. It is then allowed to cool in suitable vessels, when crystals of ferro-cyanide of sodium settle out, and are deposited.

By this process of extracting the cyanogen compounds before instead of after the gas is subjected to the ordinary absorbing operations of washing and scrubbing for the removal of tar and ammonia in the gas-works plant, it is claimed that a larger amount is obtained without diminishing the quantities of the other bye-products to an appreciable extent.

Electrically Operated Gas-Valves for Burners.—The Actiengesellschaft für Fabrikation von Broncewaaren und Zinkguss, vorm. J. C. Spinn and Sohn, and Romocki, Stanislaus Johann von, of Berlin. No. 5208; March 3, 1898.

This invention relates to gas-valves for street-lamps and other burners operated by means of electricity from a distance, as in the engraving. Fig. 1 shows the valve open, and fig. 2 closed.

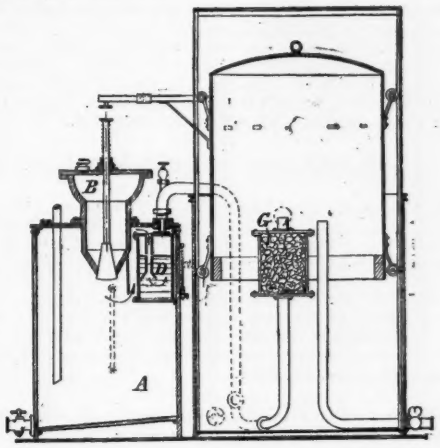


All the fixed parts of the valve are enclosed in a flat chamber, in which are arranged two electro-magnets, each acting with both poles upon its spring armature. One of the armatures is preferably placed diametrically across the chamber, and the electro-magnet actuating it is made semicircular or U-shaped. This "valve armature" actuates the gas-valve, which is preferably a conical or spherical valve. The other magnet and "catch armature" are placed to one side of the first armature. The catch armature moves at a right angle to the movement of the valve armature, and is provided with a projection which, when the valve armature is attracted by its magnet and the catch armature is free, catches by the spring action over the valve armature, and holds it to its magnet after the current exciting the latter is switched off, and releases it when the catch armature is attracted by its magnet—the peg or projection bearing against the side of the valve armature when both armatures are released.

The valve may be so connected to the valve armature that the attraction of the latter by its magnet either closes or opens the valve. In the former case, the valve is open when both armatures are released; but to close the valve the magnet of the valve armature is excited for a moment. It then attracts the armature, and the catch of the catch armature snaps over it, holding the valve closed. To open the valve, the magnet of the catch armature is excited, when it draws the peg from the valve armature, the spring of which lifts it off the magnet and opens the valve. With the reverse arrangement, when the attraction of the valve armature opens the valve, the peg on the catch armature snaps over the former and holds the valve open; while the attraction of the catch armature releases the valve armature, and the spring action of the latter closes the valve.

Acetylene Gas-Producer.—Dedecker, L. J., of Brussels. No. 5538; March 7, 1898.

This apparatus belongs to the class of generators in which the carbide, in powder or small pieces, is distributed in the water in proportion to the consumption, so as to avoid over-production. The gas bell is separate from the generator properly so called; and in combination with the generator and bell is a special mechanism commanding the distribution of the carburet in the water, automatically actuated at the desired moment by the bell itself.

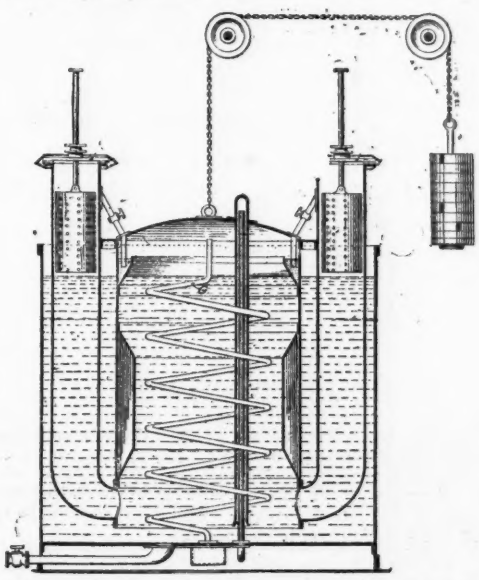


The carburet reservoir B is arranged on the cover of the generator A, the bottom of which inclines so as to facilitate the flowing of the dregs to the waste-cock shown. The carburet reservoir has a reversed truncated cone at its lower part, provided with a circular opening closed by a cone, to the summit of which a rod is fixed surmounted by a spiral spring, which serves to keep the recipient B closed by the cone so long as another force does not overcome the resistance of the spring. Inside the generator (to the right of its upper part) the purifying apparatus D is fixed, communicating on the one hand with the generator, and on the other with the tube leading to the generator. This outlet-tube has fitted to its end (within the holder tank) a drying apparatus G filled preferably with pieces of pumice-stone slightly soaked with acid. The gasholder bell bears a lateral arm terminating in a knob fixed above the chamber B. The arm is articulated towards its middle, by means of a hinge, to be able to bend upwards; but in the working position it is held rigidly by a socket arranged on it, and which can slide longitudinally. The bell has, at its lower part, a weight suited to the pressure desired to be obtained; and on its lateral side it bears stop tappets which, when the bell contains no gas, rest upon the upper edge of the tank. The socket can then be slipped on the arm and the extremity of this arm be turned upwards, so that, when the apparatus stops, the knob of the arm does not press against, and act upon, the spring.

The function of this apparatus is as follows: The granular carburet is introduced into the reservoir B, and then the knob on the gasholder arm is made to press the spring and keep the reservoir open at its lower part. The carburet falls into the water of the generator A, and acetylene gas is emitted. As soon, however, as the pressure of the gas produced and conducted into the gasholder becomes sufficient to lift the bell, the cone rises under the action of the spring, and stops the fall of carburet into the water. When, in consequence of the consumption of the gas, the pressure diminishes in the bell, the latter descends again, and causes a fresh quantity of carburet to fall into the generator.

Acetylene Generators.—Percival, J., of Edgware Road, W. No. 6006; March 11, 1898.

This apparatus for the production of acetylene comprises a gasholder, the inverted bell of which serves not only for the storage of the gas, but is so arranged that its rise and fall in the tank regulates the rate of production of the gas, or causes the production to cease. As will be clearly



appreciated by a glance at the engraving, this action is effected by permitting the rise and fall of the bell to produce a variation in the level

of the water in a gas-generating cylinder or cylinders, and thereby allow the water when its level is relatively raised in the generating-cylinder to act upon the calcium carbide; the production of gas being discontinued by the rise of the bell withdrawing the gas-generator cylinders, and thereby causing the water-level to be lowered within them. Each cylinder at its lowest end is open to admit the water from the tank. The cage to contain the calcium carbide is suspended within the hermetically sealed top of each cylinder; and pipes extend between the upper parts of each cylinder to the upper part of the interior of the bell. A stationary coiled pipe is located within the bell—fixed in the tank, and extending from above the water-level, through the water to conduct the gases as produced from the bell in a cooled state for use where required.

Gas-Cocks for Street-Lamps.—Streubel, A., of Hamburg. No. 20,842; Oct. 4, 1898.

In this gas-cock for street-lamps with double burners, arranged so as to extinguish the igniting flames, the characteristic feature is that in the plug for the main burner there is a groove or channel, with "widenings" or extensions at each side on the periphery of the plug; and for the igniting flames two grooves or channels standing at an angle to the other groove or channel, with grooves formed on the periphery of the plug, so arranged that the channels in the case belonging to the ignition flames are fed with gas when the plug is turned, for so long and so quickly that, before the channels are closed, the lighting of the main burner by the auxiliary burner is effected, and *vice versâ*.

Water-Meters.—Sápy, S., Stettner, G., Hegedüs, L., and Gyurich, S., of Buda-Pesth, Hungary. No. 23,389; Nov. 7, 1898.

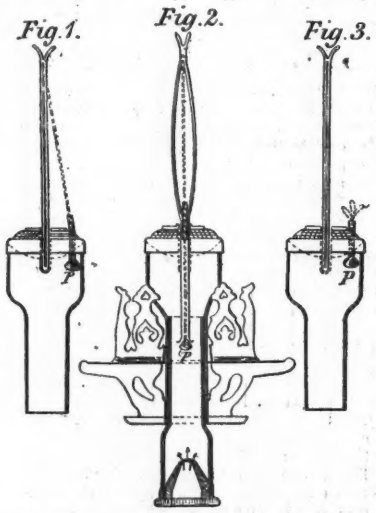
This water-meter consists of a perforated cylinder having a paddle-wheel eccentrically journalled therein, and having pivoted floats constantly bearing against the inside of the cylinder, and completely filling up its inner cross section, in such manner that the wheel is rotated by the impact of the water passing across the cylinder. In this way, from the number of rotations of the paddle-wheel shaft, the volume of water passing through may be calculated. In conjunction with the meter, an air-excluding device is employed, into which the water enters tangentially, on its way to the meter, and from which the air drawn in by the water is allowed, during the circulation of the latter, to escape through an air-pipe in the cover of the container. This air-pipe becomes completely filled with water, and is closed by a float which, moreover, on the complete emptying of the container, serves to close the main leading to the meter, and so prevent the entrance of air to the latter.

Automatic Gas-Igniter for Incandescent Mantles.—Juhasz, F., of Berlin. No. 24,283; Nov. 17, 1898.

The distinguishing feature of this automatic gas-igniting device for incandescent mantles is the production of an incandescent body, by "steeping an asbestos tissue in a 1 per cent. solution of a palladium salt, and subsequent heating to incandescence under exclusion of the air." When placed in the head of a mantle upon being brought into contact with the mixture of air and gas, the substance becomes incandescent, and thereby ignites the mixture. The patentee claims as the advantage of this arrangement that it dispenses with the labour of igniting, and prevents the damaging or destruction of the mantle.

Automatic Igniters for Incandescent Gas-Burners.—Rammoser, A., Röhrs, E., and Röhrson, H., of Berlin. No. 25,799; Nov. 29, 1898.

This igniter consists of a hollow mantle-carrier (fig. 1), forked at the top and a little curved. It goes through the head B of the burner some distance into the inside of the latter. On the lower opening of the carrier is fastened the glowing body P, whence platinum or palladium wires pass



into the forked top of the carrier. When in operation, the gas flowing into the burner spreads over the body P, causing it to glow; and thereby wires are brought to white heat, and effect the ignition of the gas. A lighting of the gas inside the mixing-pipe is not possible, the patentees remark, because the gas and air mixture there is not able to bring the wires to white heat.

In the methods shown in figs. 2 and 3, the mantle-support can also be used in its common form. For this purpose, the wires joined to the body P are conducted from below through the burner-head and (in fig. 2) are guided to the fork of the carrier, and there fastened; or (in fig. 3) they may be passed through the burner-head, and then spread out above it.

APPLICATIONS FOR LETTERS PATENT.

3201.—Serim, A., "Controlling the flow of, and igniting, gas." Feb. 13.
3244.—Vass, D., "To utilize the changes in gas pressure for opening and closing a passage (or passages) of gas supply to gas-burners." Feb. 14.
3290.—Böhndel, H. H., and Yeaton, C. C., "Manufacture of combustible gas." Feb. 14.
3318.—Travailleur, M., "Gas-engines." Feb. 14.
3401.—Walters, J. F., "Internal combustion engines." Feb. 15.
3432.—Marshall, G., "Acetylene lamps and generators." Feb. 16.
3450.—Johnston, E. D., "Rotary blowers." Feb. 16.
3457.—Jensen, G. J. G., "Holders for incandescent mantles." Feb. 16.
3459.—Nicholson, R. T., "Generation of acetylene gas." Feb. 16.
3549.—Sugg, W. T., "Burners for incandescent gas lighting." Feb. 17.
3551.—Szepczynski, S. de, "Acetylene generator." Feb. 17.
3552.—Mills, B. J. B., "Gas-furnaces." A communication from La Société Anonyme des Fontaines à Gaz. Feb. 17.
3554.—Palmer, F. B., "Lamps for lighting purposes." Feb. 17.
3555.—The Automatic Universal Gas-Lighter, Ltd., "Automatically igniting gas." A communication from Elsbach and Pollini. Feb. 17.
3565.—Bernstein, M., "Incandescent mantle for lighting purposes." Feb. 17.
3628.—Ingham, W., and Leeds Fire-Clay Company, Ltd., "Inclined retorts." Feb. 18.
3644.—Acetylite, Ltd., Clarke, J. H., and Sprott, E. W., "Acetylene gas-generators." Feb. 18.
3659.—Roger, V. J., "Heating and lighting apparatus." Feb. 18.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

Improved Sulphate Working at the Widnes Gas-Works.

Sir,—I am glad to see that the response from Mr. Isaac Carr which my inquiry called forth, has already been commented upon in letters from Mr. J. Tysoe and Mr. A. F. Ward, as the claims made by Mr. Carr for his improved heater (surely superheater is an incorrect term) are so extraordinary that they are well worth sifting.

I quite agree with Mr. Tysoe as to the functions of a liquor heater; and while I think Mr. Carr has undoubtedly a good heater, I fail to see why any other with equal heating surface should not do all that is possible with his.

It seems to me that Mr. Carr has been in error as to the quantity of fuel used before the introduction of his heater; for it is utterly impossible that any modern continuous plant, having an ordinary liquor heater, could require 45 cwt. of fuel per ton of sulphate made. Indeed I have never known this weight reached even with the old-fashioned plan of boiling liquor in bulk (except where the evaporating plan was used as well), while a modern still of the Feldmann type should not require 20 cwt. of fuel per ton of sulphate. If this is correct—and I do not doubt that many of your readers who use modern stills could confirm it—then Mr. Carr's claim of saving in fuel falls to the ground at once.

I have a very good opportuity of obtaining exactly the fuel used at this Company's chemical works, as the steam-boilers are distinct from the gas-works, and all the fuel (refuse, coke screenings, and washings) is weighed to them. The consumption of fuel during the last three years has averaged 18·2 cwt. per ton of sulphate made; and other makers using better fuel would consume less.

Any inaccuracy due to estimation of weight cannot, however, occur at Widnes with regard to sulphuric acid used, if it is weighed into the works on delivery from the makers. So that we must accept Mr. Carr's figures in this respect, while demurring to his deductions that the reduced quantity of acid used is due to the action of his heater. Indeed, the claim is so extraordinary that it is almost impossible to believe that it is put forward in sober earnest. Why should acid or its equivalent be formed from liquor externally heated, as is the case in the heater, that is not so formed when internally heated as is the case in the still itself? The answer to such a question would probably puzzle the most experienced of gas chemists. Yet this is what Mr. Carr asks us to believe.

I venture to suggest that 23½ cwt. of acid, 148° Twaddel strength, used per ton of sulphate is as much too high as 17½ cwt. is too low; and that an average of the two years—namely about 20 cwt.—is a much more usual figure.

Mr. Carr only claims a portion of the increased yield of ammonia as attributable to the improved heater. But without actual chemical proof that the heater has so acted as to produce ammonia that was not in the liquor before entering it, or that an ordinary heater could not have equally well produced, it appears to me most unwise to base comparisons on two years only, and say that the increase is due to a particular form of heater. I find on looking through our own make of sulphate for the past eight years that it has varied from 24·8 lbs. to 29·4 lbs. per ton of coals carbonized per annum; while during the same time no change has been made in the plant. The difference can, therefore, only be attributable to the quantity of liquor produced or to difference in stocks.

I have purposely abstained from referring to the soda process, as Mr. Carr frankly says in so many words that it does not pay. Excluding then chemical changes that may occur through the addition of soda, but which do not pay for its use, I believe that the savings shown by Mr. Carr are on paper only, and will never come into the coffers of the Gas Department.

Sheffield, Feb. 25, 1899. Fletcher W. Stevenson.

[Mr. Carr writes that he has been unable to prepare for publication this week a letter in reply to Mr. Tysoe's and Mr. Ward's communications in the last issue of the "Journal," but will do so for next week, and will then no doubt notice the above remarks by Mr. Stevenson.—Ed. J.G.L.]

Flash-Point Politics.

Sir,—In a letter from Mr. P. G. Pyne, Secretary to the Rural Labourers' League, which appeared in the "Journal" last week, notice is taken of a letter over my signature in your issue of the 7th inst. In that letter, and

in a subsequent article (*ante*, p. 436), I tried to discuss the matter, as it appeared to me, from a scientific point of view, having respect only to public safety secured at a reasonable price. Seemingly the reasoning has led Mr. Pyne to think that I have been writing in the interest of the Scottish trade. That, however, is not so. Neither personally nor commercially have I any interest in the question, except that I use oil in my house as an illuminant, and I have every desire that there should not be a possibility of being supplied with any but a reasonably safe oil. From this it will be seen that I have no end to serve in entering into a controversy on the subject.

I regret from a perusal of your editorial remarks last week, that there should be any grounds for misapprehension as to my meaning. It is a well-recognized fact that oils with equal flash-points are not necessarily equally safe in burning, and in endeavouring to explain the reason, my object was to show that, even with the highest-class and coolest-burning oil, 73° Fahr. was too low a flash-point to ensure a reasonable degree of safety; that, whatever might be the constitution of the oil, on attaining the temperature of its flash-point vapour would be given off capable of producing an explosion, which by bursting the lamp-fountain would be dangerous to life and property; and that the temperature of 73° Fahr. was almost unavoidably exceeded with even the coolest-burning American oils, and with lamps perfectly constructed. It will thus be seen that, in declaring 73° Fahr. too low a flash-point, I did not beg the whole question by not having grappled with the allegation that the flash-point was a function of the testing apparatus as well as of the oil. The oil contained in the lamp-fountain is necessarily under identical conditions with that in the receptacle of the close-test apparatus. The spaces over the oils are both enclosed spaces in which the vapours rising from the heated oils collect; so that in the lamp-fountain we have the exact conditions or functions which obtain in the authorized test apparatus—indeed, the old test was abandoned because the conditions were not those which obtained in the lamp-fountain and other closed places.

ALEX. ROBERTSON.

Peebles, N.B., Feb. 24, 1899.

Petroleum Flash-Point.

SIR,—I am afraid that Mr. Steuart, in his anxiety to protect home manufactures (that is the Scotch oil trade), has ignored the evidence given before the Petroleum Committee.

He asserts that the flash-point was dropped 27° in the 1879 Bill. Now Sir Frederick Abel denies this, and there does not appear to be any proof to support Mr. Steuart's assertion. The 73° Abel close test is admitted by scientific witnesses—I think, without exception—to be the equivalent of the 100° open test. Mr. Steuart repeats the statement that Sir F. Abel prescribed 105° as the oil to be used in barracks. Why does not Mr. Steuart also say in justice to Sir F. Abel (what Sir Frederick has explained over and over again), that he prescribed 105° with no reference at all to safety in burning, but only for storage, as oils kept in barracks would be likely to be kept with other stores.

This cry about raising the flash-point, which is a new one, is not warranted by the experience of 30 years; and in my opinion it is only got up for trade purposes.

F. G. PYNE,
Secretary, Rural Labourers' League.

Birmingham, Feb. 25, 1899.

Gas Stokers' Wages at Hinckley.—On the recommendation of the Gas Committee, the Hinckley District Council have decided to increase the wages of the gas stokers by 3s. per week, making 37s. 6d. per week. Concurrently with this alteration, the system of eight-hour shifts has been adopted in place of the former twelve-hour shifts.

Prepayment Meters in Hereford.—A further extension of the prepayment system of gas supply is in contemplation in Hereford; and the Town Council have sanctioned an application for a loan of £500, in addition to one of similar amount applied for not very long ago, to meet it. Since the March quarter of last year, £600 has been collected from these meters; and it is calculated that during next summer the takings will reach about £180 a month.

Colney Hatch Gas Company.—At the meeting of this Company last Thursday, the Directors reported that the conditions arising out of the prolonged summer followed by the unusually mild weather during the latter part of the past half year, were not favourable to the business. The gas-rental, however, increased; and the prices obtained for residual products showed a marked improvement. Further extensions of mains were carried out during the half year; 3600 yards of 15-inch and 10-inch pipes having been laid. The accounts showed a total revenue of £8328, and an expenditure of £6044 for the past half year; leaving a balance of £2284. The amount available for distribution was £4279. The Directors recommended a dividend at the rate of 10 per cent. per annum on the original shares, of 7 per cent. per annum on the additional shares and stock, and of 5 per cent. per annum on the preference shares; leaving a balance of £2473 to be carried forward.

The London Vestries and the Inquiry as to the Price of Gas.—At a meeting of the St. Luke's Vestry, last Tuesday afternoon, Mr. Arthur Pond brought up a report from a conference of Local Authorities north of the Thames on the subject of the high price of gas in their districts as compared with South London. The idea of the conference was to share the cost of an application to Parliament for a Committee of Inquiry. But Counsel's opinion had been taken as to whether the Authorities could incur the expense out of the rates; and Mr. A. Macmorran, Q.C., and Mr. Courthope Munroe agreed as follows: "We have perused the papers, and, in our opinion, the facts therein stated are not sufficient to justify the Local Authorities of the Metropolis, as gas consumers or otherwise, in spending money raised by rates for the purpose of defraying the expenses of appearing before any Select Committee of Parliament that may be appointed to deal with the Metropolitan Gas Companies' charges. The only Authority to promote or oppose Bills in Parliament is the London County Council." The Vestry consequently agreed not to take any further action so far as parliamentary interference is concerned; but the conference have decided to ask the County Council to take up the matter. The Electric Lighting Committee of the Shoreditch Vestry, having fully considered the question of the heavy expense to the parish of taking part in the proposed inquiry, have recommended the Vestry to withdraw from it; and this they have decided to do.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Private Bills:—

Bills read a second time: Airdrie and Coatbridge Water Bill, Arbroath Corporation Gas Bill, Barton-on-Sea Water Bill, Bognor Urban District Water Bill, Bristol Gas Bill, Bury Corporation Bill, Bury Corporation Water Bill, Church Stretton Water Bill, Coalville Urban District Gas Bill, Cobham Gas Bill, Dumbarton Burgh Bill, Dundee Gas, Tramways, and Extension Bill, Fylde Water Board Bill, Gainsborough Urban District Council Gas Bill, Glasgow Corporation Gas and Water Bill, Glastonbury Water Bill, Great Yarmouth Water Bill, Hastings and St. Leonards Gas Bill, Lanarkshire (Middle Ward District) Water Bill, Lea Bridge District Gas Bill, Leigh-on-Sea Urban District Council Bill, Loughborough Corporation Bill, Loughborough Gas Bill, Lowestoft Water and Gas Company Bill, Mid-Kent Gas Bill, Nene Valley Water-Works Bill, Perth Water, Police, and Gas Bill, Rawtenstall Corporation Water Bill, Rushden and Higham Ferrers District Gas Bill, St. Albans Gas Bill, St. Neots Water Bill, Salford Corporation Bill, Skipton Urban District Gas Bill, South Essex Water Bill, Southampton Corporation Water Bill, Stockton and Middlesbrough Water Bill, Wakefield Corporation Bill, Whitehaven Corporation Bill, Wishaw Water Bill, Wolverhampton Corporation Bill, Workington Corporation Water Bill, Yeadon and Guiseley Gas Bill.

Petitions have been presented against the following Bills: Barton-on-Sea Water Bill, Bognor Urban District Water Bill, Bury Corporation Water Bill, Cambridge University and Town Gas Bill, Church Stretton Water Bill, Cobham Gas Bill, Dumbarton Burgh Bill, Dundee Gas, Tramways, and Extension Bill, Gainsborough Urban District Council Gas Bill, Glasgow Corporation Gas and Water Bill, Great Yarmouth Water Bill, Hastings and St. Leonards Gas Bill, Lanarkshire (Middle Ward District) Water Bill, Lea Bridge District Gas Bill, Leigh-on-Sea Urban District Council Bill, Loughborough Corporation Bill, Mid-Kent Gas Bill, Nene Valley Water-Works Bill, Perth Water, Police, and Gas Bill, Rawtenstall Corporation Water Bill, Rushden and Higham Ferrers District Gas Bill, St. Albans Gas Bill, St. Neots Water Bill, Salford Corporation Bill, Skipton Urban District Gas Bill, South Essex Water Bill, South Hants Water Bill, Southampton Corporation Water Bill, Wakefield Corporation Bill, Whitehaven Corporation Bill, Wishaw Water Bill, Wolverhampton Corporation Bill.

The Corporation of Reigate have petitioned for the amendment of the Municipal Corporations (Borough Funds) Act, 1872.

The Standing Orders Committee have reported that the Standing Orders not complied with in the cases of the Skipton Gas Bill and the Newhaven and Seaford Water Bill ought to be dispensed with, and the Bills allowed to proceed. The proceedings on the Skipton Bill are reported below; and in the case of the Newhaven and Seaford Bill the Committee stipulated that clause 53, extending the provisions of section 72 of the Water-Works Clauses Act, 1847, to all dwelling-houses or parts thereof occupied as separate tenements, and let for any period less than three months, should be struck out.

HOUSE OF COMMONS.

Monday, Feb. 20.

METROPOLIS WATER SUPPLY.

Mr. CHAPLIN, as briefly recorded in the "JOURNAL" last week, asked leave to introduce a Bill to enable and require the Metropolitan Water Companies to supply each other with water in cases of emergency. He said the object of the Bill was to prevent any recurrence of the curtailment of the water supply of the Metropolis, which inflicted so much inconvenience—in some cases almost amounting to suffering—on many of the poorer inhabitants of London during the drought and excessive heat which prevailed last summer. At that time, this curious and unfortunate anomaly arose—that while the district supplied by the East London Water Company was deprived of its constant supply, and many of the inhabitants, especially the poorest class of inhabitants, in East London were in consequence suffering not only from inconvenience and annoyance, but in some cases from severe and positive hardship, there was water enough and to spare in other districts of London; and if there had been adequate means for its distribution, if there had been communication between the mains and the works of the different Water Companies, so as to enable the surplus water of one Company to supply the deficiencies of another, there would have been no trouble, no difficulty, and no curtailment of the supply. This statement was borne out by the report of the Royal Commission; and that in spite of a deficient rainfall in the valley of the Thames and of the Lea—the present sources of supply—and the consequent drought, which had been without precedent for 86 years. The obvious way to prevent the recurrence of this state of things was to provide for the intercommunication of the Companies; and it was proposed to accomplish this as follows: In the first place, the Bill required the different Companies, upon the direction of the Local Government Board, to submit schemes and to construct such works as in the opinion of the Board might be necessary for the purpose; and, secondly, in case of an emergency such as that of East London last year, the Companies were to supply (in the words of the Bill) "at a reasonable cost, and to such extent and during such period as the Board may direct, such water as may be required for the need of another Metropolitan Water Company, and may be available after satisfying the requirements of their own districts." The Bill further provided that the cost of construction was to be borne by the several Companies according to their respective water rentals; and the terms upon which the water was to be supplied were to be settled, in default of agreement, by arbitration. Certain statutory impediments which at present existed to the construction of works and the supply of water by a Company beyond the confines of their own district were removed by the Bill. Powers were given to the Local Government Board to make orders for the purposes of the Bill, for fixing the times within which schemes were to be submitted and works

were to be constructed, and other matters of the kind; and the recommendations of the Royal Commission as to borrowing powers, and also as to the provisions to be made in case of purchase of the undertakings of the Companies at any time within seven years after the passing of the Act, were also embodied in the Bill. In view of the calamity which occurred last summer, and of the report and recommendations of the Commission, which the Government appointed themselves, and particularly in view of the fact that the Commission were specially asked, on behalf of the Government, to report on this branch of the subject committed to them as speedily as possible, the Government felt it to be their duty to give effect to these recommendations of the Commission, or to such of them as appeared to them to be good, by a measure of their own.

Mr. Buxton said the Bill appeared to him to be of the most futile and microscopic character, and certainly one that any Government who had, like the present Government, pledged themselves to deal with the London Water Question should be ashamed to introduce even as a temporary measure. He should not oppose a measure to make communication between the mains of the East London Water Company and the other Companies with a view to preventing a water famine; but if, on examination, he found that the present Bill was likely to prejudice the questions of the future water authority, the purchase value of the undertakings, the supply, or the position of the ratepayers or consumers, he should have to do so.

Leave was given to introduce the Bill, which was subsequently presented and read the first time. Its provisions are noticed in another part of the "Journal."

METROPOLIS GAS SUPPLY.

Mr. Cohen (East Islington) moved—"That a Select Committee be appointed to inquire into the powers of charge conferred by Parliament on the Metropolitan Gas Companies, and to report as to the method in which those powers have been exercised, having regard to the differences of price charged by the various Companies." A debate arose; but it being midnight, it was adjourned.

Mr. Pickersgill on the following day gave notice of an amendment, to add at the end of the motion, "and also whether the provisions of the Acts fixing the price of gas supplied and the rate of dividend should be reconsidered."

Tuesday, Feb. 21.

LONDON WATER (PURCHASE) BILL.

The second reading of this Bill was down for to-day; but, as recorded last week, notices to move its rejection had been given by Sir F. Dixon-Hartland and Mr. Whitmore. Under these circumstances,

Mr. J. Stuart said he thought it would be for the convenience of the House if he stated the course which the County Council proposed to take in regard to the Bill. They were not without hope that the views of the Royal Commission on the question of purchase might become known on a fairly early date, seeing the efforts made by the Commission to conclude the consideration of the evidence submitted to them. While the County Council recognized that it was the House itself which must decide the question on its own responsibility, they proposed to defer the Bill to a date which, while enabling them to proceed with it this session, was one on which the House might reasonably expect to know how matters stood.

The order for second reading was postponed till the 15th prox.

The following further progress has been made with Bills:—

Standing Orders complied with: Crowborough District Water Bill, East London Water Bill, East London Water (Temporary Supply) Bill, Gaslight and Coke Company Bill, Horsforth Water Bill, Shotley Bridge and Consett District Gas Bill, West Middlesex Water Bill.

Bills read a second time and committed: Ayr Burgh Bill, Birmingham Corporation Bill, Blackpool Improvement Bill, Bootle Corporation Bill, Brigg Urban District Gas Bill, Clay Cross Water Bill, Crowborough District Gas Bill, Derby Corporation Water Bill, Dublin Corporation Bill, Fishguard Water and Gas Bill, Godalming Corporation Water Bill, Goole Urban District Council Bill, Ilford Urban District Council Gas Bill, Leicester Corporation Water Bill, Manchester Corporation (General Powers) Bill, New Mills Urban District Council Water Bill, Nottingham Corporation Bill, Nuneaton and Chilvers Coton Urban District Council Water Bill, Otley Urban District Council Water Bill, Rhondda Urban District Council Bill, St. David's Water and Gas Bill, Scunthorpe Urban District Gas and Water Bill, Sheffield Corporation (Derwent Valley) Water Bill, Shirebrook and District Gas Bill, Warrington Corporation Bill, Wetherby District Water Bill.

Petitions have been presented against the following Bills: Ayr Burgh Bill, Barking Town Improvement Bill, Belfast Water Bill, Blackpool Improvement Bill, Bootle Corporation Bill, Bradford Tramways and Improvement Bill, Brigg Urban District Gas Bill, Burley-in-Wharfedale Urban District Water Bill, Clay Cross Water Bill, Darwen Corporation Bill, Derby Corporation Water Bill, Dublin Corporation Bill, East London Water Bill, East London Water (Temporary Supply) Bill, Fishguard Water and Gas Bill, Gaslight and Coke Company Bill, Godalming Corporation Water Bill, Goole Urban District Council Bill, Horsforth Urban District Council Water Bill, Horsforth Water Bill, Ilford Gas Bill, Ilford Urban District Council Gas Bill, Leicester Corporation Water Bill, London Water (Finance) Bill, London Water (Purchase) Bill, Manchester Corporation (General Powers) Bill, Menstone Water Bill, Metropolitan Water Companies Bill, New Mills Urban District Council Water Bill, Otley Urban District Council Water Bill, Redditch Gas Bill, Rhondda Urban District Council Bill, Scunthorpe Urban District Gas and Water Bill, Sheffield Corporation (Derwent Valley) Water Bill, Shirebrook and District Gas Bill, Stockport Corporation Water Bill, Stockport District Water Bill, Walker and Wallsend Union Gas (Electric Lighting) Bill, Warrington Corporation Bill, West Gloucestershire Water Bill, West Middlesex Water Bill, Wetherby District Water Bill, Woking Water and Gas Bill.

Petitions in favour of the London Water (Finance and Purchase) Bills have been presented by the Vestry of St. Mary, Islington.

A large number of petitions have been presented for an inquiry by a Select Committee into the subject of municipal trading; one being from the Engineering Employers' Federation and another from the South Metropolitan Gas Company.

HOUSE OF LORDS COMMITTEE ON STANDING ORDERS.

Thursday, Feb. 23.

SKIPTON GAS BILL.

This Bill, which, it will be remembered, had been reported by the Examiner as failing to comply with Standing Orders, came to-day before the Standing Orders Committee, under the presidency of Lord Morley.

Mr. Hooker (of Messrs. Wyatt and Co., Parliamentary Agents) appeared for the promoters; Mr. Lees (of Messrs. Baker, Lees, and Co.) represented the memorialists, the Skipton Urban District Council.

Mr. Hooker, for the promoters, stated that the memorialists were, by a competing Bill, seeking to compulsorily acquire the undertaking of the Skipton Gas Company. He contended that by the use of the words "Adoption of the Sliding-Scale, with Standard Rates of Dividend," as a short heading in the "Gazette" notice, a specific indication had been given of the intention of the Bill to substitute for maximum rates of dividend standard dividends subject to the operation of the sliding-scale.

Mr. Lees, for the Skipton Urban District Council, in arguing that the promoters had not complied with Standing Orders, pointed out that if clauses 18 and 21 of the old Act, putting the Company under maximum dividends of 9 per cent. on the original capital and 7½ per cent. on the additional capital, were repealed, the Company would be enabled, with the present price of gas, to distribute dividends of £10 2s. 6d. and £8 8s. 9d. per cent. respectively. The present price of gas was 2s. 11d. per 1000 cubic feet; but sixteen months ago it was 2s. 8½d. If, therefore, under the proposed re-arrangement, the charge was reduced to the latter figure, the Company would be able to divide £10 13s. 9d. and £8 18s. 1½d. per cent. on the original and additional capital respectively. He asked that the clauses giving the Company this power should be struck out; and that the model clauses of their Lordships' House, providing for standard dividends in connection with the sliding-scale, should be inserted.

Mr. Hooker, in reply, said the argument of the memorialists had been based mainly on merits, rather than on the question of non-compliance with Standing Orders. He contended that the notice conveyed all it should do to everybody who knew anything about such matters.

The Committee decided that the Standing Orders should be dispensed with, and the Bill allowed to proceed.

LEGAL INTELLIGENCE.

"Is Electricity an Article?"

This was a question put by the Stipendiary Magistrate at the Bilston Police Court (Mr. N. C. A. Neville) last Tuesday for someone to answer. It was asked under the following circumstances: The Bilston Urban District Council were summoned as occupiers of the Market Hall—this being a factory within the meaning of the Act—for neglecting to affix at the entrance to the factory the prescribed abstract of the Act. Mr. Jackson (Factory Inspector) explained that the summons had been taken out as a test case, and was in respect of the electric light and generating station supplying light to the hall. Steam power was used on the premises, and manual labour was also exercised in producing electricity; but on the 14th of December there was no abstract of the Act affixed on the premises. It remained to be shown that electricity was an "article," manufactured by way of trade for the purpose of gain, as stated in the Act. The Stipendiary: Is electricity an article? Mr. Wassell (Clerk to the District Council): I say it is not. Mr. Jackson: There is no definition given in the Act of what an article is. The Stipendiary: You cannot catch hold of a lump of electricity. Mr. Jackson: You can feel it, though. The Stipendiary: You can feel wind; but you would not call that an article. Mr. Wassell said his contention was that electricity was not an article within the meaning of the Act, and that the District Council did not make it by way of trade for the purpose of gain. Mr. Jackson argued that electricity was sold to the market tenants, and that they paid a certain amount yearly for it. The Stipendiary said Mr. Jackson must show that the lighting was included in the rent of the stalls. In reply to his Worship, Mr. Wassell said his contention was that the Council were in the same position as the owner of a house, who, for his own purpose, put down a private installation, and supplied himself with electricity. This would not be a factory. If the Council had gone to the Board of Trade for a Provisional Order empowering them to provide electricity and to make profit, he should admit at once that they were trading; but they had done nothing of the sort. They had provided the Market Hall with light under the Public Health Act. They were making no profit, but losing every year. The District Council could not go into trade. Eventually the Stipendiary adjourned the case to afford an opportunity of finding out what an article is.

Unlawfully Keeping Carbide of Calcium and Petroleum.

At the Marylebone Police Court, on Monday last week, "General" Booth, of the Salvation Army, was summoned for unlawfully keeping in a hayloft, over a stable attached to No. 51, Fortess Road, Kentish Town, a quantity of carbide of calcium, and for unlawfully keeping a quantity of petroleum at 79, Fortess Road, in contravention of the Petroleum Acts. In the loft were 15 metal drums, each containing 1¼ cwt. of carbide, or about 19 cwt. in all. The petroleum was found to the extent of 1½ pints on a bench in the Army Cycle Works, in Fortess Road, in close proximity to two gas-jets. It was explained that the "General" was on tour in Australia; and it was pleaded that the offences were committed in ignorance, and that the carbide was disposed of as soon as possible. Mr. Plowden imposed fines of £5, with two guineas costs, on the first summons, and 40s. on the second.

The Highways Committee of the London County Council have recommended the acceptance of the tender of Messrs. J. E. H. Andrew and Co., Limited, of Reddish, for the supply of gas-engines, &c., required in connection with the electric light installation for the Victoria Embankment and Westminster Bridge.

MISCELLANEOUS NEWS.

THE HOME OFFICE WATER-GAS INQUIRY.

The report of the Departmental Committee on the supply of water gas has created no small stir in the gas industry; and it has been the topic of the week among members of the profession. So far, however, as we have been able to gather, nobody seems to seriously think that effect will be given to the Committee's proposals—at any rate, as they stand. Among many others who are of this opinion are Mr. A. E. Broadberry, the President of the Southern District Association of Gas Engineers and Managers, and Assistant-Engineer of the Tottenham and Edmonton Gas Company, and Mr. J. T. Westcott, of the Economical Gas Apparatus Construction Company, Limited. We append the views of these gentlemen on the report, believing that they will be read with interest, seeing that the former has (with his father) had a considerable experience with water gas at Tottenham, and that the latter was trained in the home of water gas, and is deeply concerned in its present and future manufacture in this country.

Mr. A. E. Broadberry's Practical Experience Disproves one of Dr. Haldane's Leading Points.

At the close of the meeting of the proprietors of the Tottenham and Edmonton Gas Company last Saturday, our representative, in a conversation with Mr. Broadberry, asked him whether he would give him for publication his opinion on the report. With his usual courtesy, Mr. Broadberry readily consented; and here is what he said: I have a very strong opinion on this report, which opinion, I believe, is in accordance with that of every gas engineer who has any practical acquaintance with the distribution of water gas. I think the report is not at all to the credit of the five undoubtedly learned men who are responsible for it; and really I never read a greater mass of rubbish than is contained in the bewildering string of words comprising the report. Had there been any sense in it, it might have been put concisely in half a page, because the sounder the sense the more pronounced it is, and the more crisply can it be expressed. Now I am going to point out to you what I consider a fair sample of the whole report. A laboured argument is got up on Table I.; and I will pick out the extreme figure from the table—that relating to San Francisco. This indicates that 70 per cent. of carburetted water gas in the gas supply of London would produce 940 deaths in one year in the Metropolis. At Tottenham, which is a fairer criterion of London than any American town, we have sent out, as nearly as possible, 1000 million cubic feet of water gas since we first commenced; and this has been mixed with a similar quantity of coal gas. With this proportion, I do not think any one of the Committee would dare sleep in Tottenham. The total 2000 millions is one-sixteenth of the standard yearly London output on which the table is based. Therefore, according to the table, we ought to have killed something approaching 59 people; but not one has been killed. Even before water gas was introduced, I do not remember a case of suffocation in our district during the twenty years I have been with the Company. So that, even if we supplied coal gas only, by the law of averages on which so much faith is put by the compiler of the table, one or two deaths would not have been surprising; but even then the table would have been a long way out. I admit I have taken the most extreme case. But look again at the report, and see how the argument goes on: "Assuming that Boston has a death-rate equal to that of London, about one death in every three hundred deaths is due to accidental"—"accidental," mind you—"water gas poisoning. This represents an annual death-rate about the same as that of 'child-birth' or of suicide." Now our district has a population of about 200,000. I do not quite remember the death-rate; but say it is 20 per 1000, that means 4000 deaths per year, or 18,000 deaths in the four-and-a-half years during which we have supplied water gas. Divide this by 300, and you have 60 people whose blood ought to have been on our heads; but it isn't. So you see, taking the extreme case in the table or the argument, we get just about the same figure; and both are shown by our experience to be absolutely false. I was going to say "wickedly" false; but I do not think the men who constituted the Committee would make such mistakes wilfully. Terror must have upset their judgment. Why did they not take Tottenham as an indication of what water gas would be in London? Surely we are near enough; and certainly 50 per cent. ought to be a reliable experiment. I do not think I need say any more. I believe what I have said will show that the Committee have, in their scientific fright, built up a fortress of cards; and if the first puff of indignation of those who know from experience the suitability of carburetted water gas for burning does not shatter it, I shall be surprised.

Mr. Westcott Prefers Inspection to Restriction.

Mr. Westcott's views were also obtained in the course of an interview. He admits that the Committee made an exhaustive investigation, but that the mass of conclusive information laid before them had practically no influence upon them whatever, and that their conclusions were drawn from wrongly-founded premises, which were at variance with the actual facts. In his judgment, the constitution of the Committee was such that had they been set to work to investigate the question of sewer gas, and pursued the same lines, they would have drawn the same conclusions, and asked Parliament to prohibit only a certain percentage of sewer gas—seeing that the public are in constant danger from that insidious enemy to health. The medical and chemical members of the Board seem to have looked at the question solely from the specialist and laboratorial point of view. As a practical gas engineer, who has studied the question in almost every country and every climate where this method of manufacturing gas is practised, he ventures to assert that where the Committee have erred has been in applying to this country facts and figures referring to America, where the conditions of living are altogether different from those obtaining in this country; and the application of those facts and figures to these different conditions has manifestly had the effect, to a considerable degree, of warping the judgment of the Committee. Before information of the kind alluded to had any weight, they should have been substantiated by evidence obtained under the conditions existing in this country; and in this the inquiry was a complete failure, seeing that, although carburetted water gas has been in use in certain towns in this country for some years now, nothing approaching substantiation could be procured.

It is a remarkable fact, says Mr. Westcott, that some of the oldest coal-gas men in America who were at one time prejudiced against water gas, and would not have anything to do with it until long after its introduction, have since installed it at their own works, and are now the most ardent in praising its merits. If legislation were needed on the subject, it seems very curious, points out Mr. Westcott, that ten years after a law had been passed by the Massachusetts Legislature practically prohibiting the use of water gas it should then have been repealed, and that 223 physicians should have signed a petition in favour of the repeal, while only 158 could be found to sign a counter petition. The action of the people of the State of Massachusetts would seem to indicate, in Mr. Westcott's opinion, that their feeling was that the advantages to be derived from carburetted water gas were more than an offset against any additional danger that might be attributed to it. And he further thinks it probable that, if any restrictive legislation is passed in this country, the same course of events will be seen here as ensued in the case of Massachusetts. From his knowledge of the subject, he considers it would be far wiser to leave to the discretion of gas companies and committees the adoption of those methods of manufacture and distribution best suited to their own particular localities, and not to tie their hands in their efforts to provide an adequate and cheap supply for their consumers. If any legislation at all is needed, it appears to Mr. Westcott that it should be in providing for the inspection of pipes and fittings. This would, he believes, have a far greater effect in keeping at a minimum the number of accidents and deaths from gas poisoning than legislation in any other direction.

Commenting upon the "recommendations" of the Committee, Mr. Westcott points out, with reference to No. 1, that carburetted water gas already possesses "a distinct and pungent smell" equal to, and in fact exceeding, that of coal gas; so that there would be no fear of the suppliers transgressing in this respect. With regard to No. 2, he says that much inconvenience would be experienced in having to make a declaration at the time of applying for statutory powers as to the kind of gas to be distributed, seeing that between the application and the construction of the works, it might be found necessary, for local reasons, to change the method of manufacture or the percentage of the mixture; otherwise, if tied in this way, the stockholders of a gas company or a corporation might lose much of the money invested. To his mind, the third recommendation would cause a vast amount of harm. It would tend to frighten timid people—the wealthier consumers would be tempted to turn to electricity, and the middle class and poorer ones to oil; and the result would be great and permanent injury to a great industry. Besides which the gas suppliers would be subjected to a far greater number of uncalled-for complaints than they are at the present time. Then as to No. 4 recommendation, it is virtually carried out now in every place where carburetted water gas is made, as records are already kept of the make. He can see no objection to returns being made to the Board of Trade; but he is strongly averse to the consumers and ratepayers of a district having the extraordinary right of disturbing the gas manager "at all times" to refer to his books. Much unnecessary annoyance and trouble would be caused, and this no doubt to its greatest extent at the time the gas manager is being most hardly worked, and when he least requires any extraneous worry. As to No. 5—the limitation of carbonic oxide—in Mr. Westcott's judgment this might also be left to the discretion of the gas suppliers, in accordance with the local requirements. In part, the sixth recommendation meets with Mr. Westcott's approval. If, he says, a Central Department were appointed to see that all gas burners, fittings, and apparatus were of a certain standard, and to arrange for their inspection and testing, this would be an important outcome of the Committee's labours. In view of what he has previously stated, Mr. Westcott cannot see the necessity for the final recommendation.

A SUMMARY OF THE EVIDENCE.

In giving in last week's issue the report of the Committee, we promised to present our readers with an epitome of the evidence submitted at the twelve sittings held for the purpose. It will be observed that the bulk of the evidence came from gentlemen more or less intimately connected with the gas industry, and that the opposition to the supply of water gas put in a very poor appearance. In fact, although the inquiry was the result of an outcry in two or three places against the supposed awful danger attending the distribution of water gas, the Committee must admit failure in securing—and we have no hesitation in saying that they themselves recognized the difficulty of doing so—an adequate representation of the antagonistic party. We notice that Lord Belper (the Chairman), Dr. Parsons, and Professor Ramsay attended the whole of the sittings; Dr. Haldane was only absent once; and Mr. Cunynghame on three occasions. The first day on which evidence was received was Tuesday, March 1, when

Mr. A. G. Glasgow, *of Messrs. Humphreys and Glasgow,*

opened the evidence by giving the Committee fully and freely of his thirteen years' experience in the manufacture of water gas both in America and this country. He started by describing the apparatus and method of production, following up with some information on the enrichment of the gas by crude oil or cheaper distillates. In connection with this part of the subject, the Committee learned that the hydrocarbons derived from the oil imparted to the gas an odour as pungent and characteristic as that of coal gas; also that, in carburetted water gas and coal gas manufacture there was a very great difference in the temperatures of the nascent gases, and that it required rather drastic treatment to get the intensely hot water gas quickly reduced to normal temperature. Asked as to the danger of the vapour being lost on which water gas depended for its illuminating power, he said that in modern apparatus, carburetted water gas, although of high candle power, was unquestionably more fixed than even 16-candle coal gas. Professor Ramsay was here curious as to whether any attempts were made to rid the gas of carbonic acid. Witness satisfied him by saying that it was usually a question of relative economy. In this country it was commonly more advantageous to extract the carbonic acid

than to use the additional oil to counteract its depreciating effect upon the illuminating power. The accepted methods and apparatus for purification were common to both coal gas and water gas. Responding to a request for information as to the "character" of water gas, witness put in the table which he included in his paper read before the Cleveland Institution of Engineers at Middlesbrough on Jan. 11, 1897, and which was reproduced in the "JOURNAL" issued the following week. It illustrated the chemical, physical, and thermal properties of carburetted water gas in comparison with Heidelberg coal gas. He pointed out, by its means, the qualitative similiarity between the two gases; there being no gas present in the one which was not in the other. But quantitatively there was a considerable difference—for instance, the carbonic oxide was nearly three times greater in the water gas compared with Heidelburg coal gas. The two samples of water gas gave 24·20 and 23 per cent. of carbonic oxide, as against 8·88 per cent. in the coal gas. For English coal gas, the figure would probably run under this; but in Edinburgh it was 10 per cent. [Dr. Haldane interjected the statement that he had known it to be 12 per cent. in Oxford gas.] There was a point illustrated in the table, continued Mr. Glasgow, of which very little notice had been taken heretofore, although, in his opinion, it was the most important question in considering the safety of carburetted water gas for general distribution—that was, carburetted water gas required *per unit of light* little more than half the quantity of air for perfect combustion that coal gas did. The products of combustion, including aqueous vapour, differed very little per cubic foot; but per pound of sperm (the unit of luminosity), the vitiating products from the water gas were but half the quantity produced by coal gas. There would be a modification in the figures when applied to this country due to differences in candle power; but the principle remained—that much more light might be obtained for the same vitation of the atmosphere, and the same absorption of the oxygen of the room. There were two other features of the highest importance—the first being the character of the flame. Taking carburetted water gas and coal gas of equal candle powers, the former burnt with a smaller and much more brilliant flame; the intense incandescence to which the carbon particles were exposed leading to greatly improved combustion. This feature was more far-reaching in its effect than might be at first supposed; for the great objection to lighting by coal gas which was the ruling consideration in almost every instance of its displacement by electricity, was the inevitable destruction of ceiling and other decorations owing to imperfect combustion at the burner, and the generation of noxious sulphur products. He was speaking from personal, as well as common, experience when saying that the 30-candle power carburetted water gas of New York, and other American cities, was used, in ordinary flat-flame burners, with a freedom from soot and noxious products unapproached in towns supplied with ordinary 16-candle coal gas. The effect of London gas, as supplied to-day, was far more injurious than the gas of vastly higher power supplied in New York. Carburetted water gas contained scarcely one-fifth of the sulphur usually present in coal gas; and this being almost exclusively in the form of sulphuretted hydrogen, oxide of iron purification alone reduced it below 5 grains per 100 cubic feet. This was a point of greater importance than any; for all persons using gas, and even those who did not use it themselves were, apart from the debatable question of the relative danger from escapes due to accident or negligence, exposed to the evil effects of the products of combustion. These evils were very much mitigated in the case of carburetted water gas. Every time he entered his office the sulphurous smell stung him as soon as he opened the door. Heretofore Parliament, in legislating in connection with the sulphur to be allowed in the gas distributed, had not legislated as to what it would like to have, but what it was feasible for gas companies to do. This he submitted was a matter of very marked importance. His contention was that the products of burning ordinary coal gas were much more noxious to health than those from carburetted water gas. The special advantages of this gas as an enricher of coal gas were what led to the original adoption of the process in the United Kingdom, although its economy soon secured it a more important footing. The auxiliary manufacture of carburetted water gas afforded a perfect, and the only known, means of combining production with enrichment in proportions that might be instantly adjusted to suit immediate requirements. Naturally, this resulted in decreased expenditure and retort-house repairs. But the most convincing reason why carburetted water gas was at its best when one of its functions was the enrichment of lean coal gas was that the higher its quality, within practical limits, the cheaper was its cost per candle. Suppose, for instance, a works was making carburetted water gas of 18-candle power at 1s. per 1000 cubic feet with 2½ gallons of oil costing 3d. per gallon, by simply adding a gallon of oil, or 25 per cent. of the total cost, the quality of the gas would be raised to 25 candles, or 40 per cent., and the original 1000 cubic feet increased to about 1100 feet by the bulk derived from the extra gallon of oil. Hence the Committee would be prepared for the statement that in many localites enrichment by carburetted water gas cost *nil*, since the enriching gas, though of higher candle power, cost less per 1000 cubic feet than the lean coal gas. This contrasted strikingly with the waning method of enriching coal gas by means of cannel, whereby the cost of each candle of enrichment above the normal quality yielded by the coal, frequently reached 2d. per 1000 cubic feet—in fact enrichment by carburetted water gas had proved so economical that many undertakings, particularly corporations, had voluntarily raised the illuminating power of their gas. Water-gas plant was first employed in this country for enrichment purposes at Beckton; but a reduction in the price of gas oil, with improved facilities for handling it in bulk, had shown the cost of the process to be so low that water gas had passed beyond the question of enrichment into a question of production, and particularly of taking up every fluctuation in production. Witness next pointed out the well-known "collateral" advantages—such as, the control of the coke market, the small ground space occupied by the plant, the emergency quality, the saving in first cost and also in repairs (¼d. per 1000 cubic feet compared with 2d. to 3d. in coal-gas plant), instant control of candle power, approximate independence of crises in the coal supply (the surplus coke from the quantity of coal used in producing 1000 cubic feet of coal gas yielding 3000 cubic feet of water gas), the practical independence of labour, the prevention of naphthalene deposits, and the action of the diluent gases in promoting perfect combustion at the burner. Of course, the economy of the process depended on the local cost of supplies and other conditions. Witness was next desired to inform the Committee as to the use of water gas in America. He traced its history from 1878; attributing its introduction to the tremendous development of the petroleum fields. In his opinion, the early extension of carburetted water gas in America was conducted in an unbusiness-like way; but now Boston was supplied with carburetted water gas without any mixture of coal gas, 90 per cent. of the supply of New York was carburetted water gas, and he believed the whole of the supply of Chicago and Baltimore, and a great portion, if not all, of Washington. Philadelphia had a municipal works, and had been for years purchasing carburetted water gas from the United Gas Improvement Company. Witness next read a statement from the 1896 catalogue of this Company, which (summed up) showed that in the United States 418 Companies manufactured only coal gas, and 412 Companies water gas wholly or in part; but a comparison of the relative volumes of gas revealed the fact that of about 60,000 million cubic feet of gas (the yearly estimated make in the United States), about 70 per cent. or 42,000 million cubic feet was water gas. The distribution of carburetted water gas was also very general in Canada. In the United Kingdom, plant had been installed up to a daily production of 65 million cubic feet; and extensions for the production of 10 millions daily were now in course of erection. This, of course, did not mean that this quantity was made, but it represented the producing power in the hands of gas suppliers. On the Continent, an import tax of over 100 per cent. on the value of the oil employed had prevented carburetted water-gas manufacture in most countries. But the Corporations of Copenhagen, Brussels, Rotterdam, and Bremen had adopted the process; and there were now indications of rapid Continental extension. So far as he knew, the question of carbon monoxide had never influenced Continental decision. All cases where he had been consulted were decided on economic grounds. On the contrary, in view of the high cost of oil, there was a serious disposition on the Continent to consider the supply of uncarburetted water gas, either alone or in combination with odorous coal gas, in connection with incandescent gas-burners. In carburetted water gas, there was nearly three times as much carbonic oxide as in English coal gas; but so far as the manufacture was concerned, there was not the slightest evidence that the gas was injurious to those engaged in its manufacture—in fact, the nature of the process required less exposure of the workmen. Witness's attention was called to complaints which the Local Government Board had received as to nuisance arising from sulphuretted hydrogen being given off into the air with the products of combustion; and, in reply, he said that, if the operation of first drying out new apparatus were unduly hastened, and the atmosphere heavy, the products of combustion might become temporarily objectionable in the immediate vicinity, but in ordinary working the secondary combustion would prevent sulphuretted hydrogen being discharged into the atmosphere, even if produced from the sulphur in the coke. He had heard of one or two cases where neighbours had complained of smell, but nothing serious; and he had never heard of legal action being taken. Questioned as to the danger attending the use of carburetted water gas, witness said he had had a very intimate experience of carburetted water gas distributed *per se*, and of coal gas; and he had seen no evidence to show that the displacement of coal gas by carburetted water gas had made any difference, except in improving the character of the products of combustion. In certain of the manufacturing operations, the men preferred the carburetted water gas, because there was no evidence of ammonia. The men suffered from gassing with coal gas just as much as with carburetted water gas. If the gas escaped in a room, owing to the pungent smell imparted to it by the oil, there was just as much chance of it being detected as coal gas. Unquestionably carbonic oxide was noxious to health if anybody was subject to an escape of it; and the fact that carburetted water gas contained three times as much carbonic oxide as coal gas rendered an escape more dangerous. But at the same time, there were many other gases present, the toxic qualities of which were not very well known. Carbonic oxide treated alone was certainly the most dangerous; but it was opposed to his experience that the danger of such mixtures was in proportion to the carbonic oxide present. They were certainly not justified in saying that because carburetted water gas contained three times the quantity of carbonic oxide that coal gas did, it was consequently three times as dangerous. Practical experience did not show that the danger of carburetted water gas varied as the carbonic oxide present. In a report by Professor Lewes on the subject to the Birkenhead Corporation,* he had assumed a room 10 feet cube, containing 1000 feet of air, to be used as a bedroom, the doors and windows closed, but chimney free, and the danger to be provided against being a jet discharging 6 cubic feet hourly unlighted into the room. Taking admitted figures as to ventilation, he deduced that, provided there was not more than 16⅔ per cent. of carbonic oxide in the gas, it would not be dangerous to a person sleeping overnight, and was consequently safe. This was the conclusion to which present scientific consideration led. On the other hand, however, they knew from experience that coal gas containing only 5 per cent. of carbonic oxide would often prove fatal. By this he (witness) did not wish to convey that scientific knowledge could not determine this question, but that scientific knowledge had not yet been carried far enough. His argument was that both gases were practically dangerous under the conditions he had mentioned; and what he had cited was merely to show that conclusions drawn from present imperfect scientific data were apt to be very misleading. Other elements besides the percentage of carbonic oxide entered into the question. Interrogated further on this point, he said his criticism simply amounted to this, that 16⅔ per cent. of carbonic oxide had been laid down as safe by scientific deduction, but he discredited such system of reasoning, because he believed that escaping coal gas with only 5 per cent. of carbonic oxide in it would probably be fatal under the conditions described. If they accepted the 16⅔ per cent., coal gas might escape at the rate of 20 feet hourly without danger. He repeated that they could not ignore the influence of the other gases. In his opinion, there was no need for intervention in regard to the distribution of water gas. He could give no figures as to the total amount of water gas used in a year in London; but there were districts in which the supply of gas contained 30 per cent. With London coal gas possessing (say) 8 per cent. of carbonic oxide, and carburetted water gas with (say) 28 per cent., a mixture containing 30 per cent. of the latter would have present 14 per cent. of carbonic oxide. Carbonic oxide, being one of the heaviest gases in illuminating gas, would be considered an element of safety rather than of danger.

* See "JOURNAL," Vol. LXIX., p. 893.

Carburetted water gas was 50 per cent. heavier than coal gas; hence in the case of accidental leakage far less would escape. This, in connection with the fact that less air was required for combustion, very much minimized the risk of explosion. This statement suggested to Mr. Cunynghame a disadvantage—that if different sorts of burners were required for water gas and coal gas respectively, and the proportions of the gases were varied, the consumers might on occasion have a loss of illuminating power. In witness's opinion, such a thing might be possible; and, therefore, he agreed that it was desirable, in the interests of the consumers, to keep the ratio tolerably constant. On the question of the number of deaths arising from gas poisoning, he said the New York Board of Health Reports showed that there were 90 in 1867 and 95 in 1868, prior to the introduction of water gas, with a population of 800,000. The years 1895 and 1896 showed 100 and 95 deaths respectively, with treble the population, and 90 per cent. of water gas used. This, he said, included all cases of suffocation, asphyxia, and suicide, as well as gas poisoning. He had known three cases of poisoning in Belfast; but not fatal ones; and in each he should have expected fatal results even from coal gas.* Water gas had been used in Belfast since 1893, in proportions sometimes reaching 70 per cent. He had had men asphyxiated with both coal and water gas; but had always recovered them. For this purpose, he was a firm believer in oxygen.

The second instalment of evidence was taken on March 11, when

Mr. George Livesey, *Chairman of the South Metropolitan Gas Company*,

was called. At the outset, he said his Company had never used water gas; and he confessed that he would rather stick to the old-fashioned gas, although this might be said to be prejudice. He proposed to divide his evidence under two heads—first, the reasons for adopting the process, and then the objections. The main reason why, he thought, carburetted water gas was introduced was for the purpose of enriching coal gas. Whenever a gas company's Bill was in Parliament the local authorities invariably opposed; and one ground of opposition was that the gas was of too low illuminating power. Parliament had from time to time increased the nominal illuminating power of the gas by a candle or two. This had had the effect of rendering it impossible for the gas companies to produce gas of the parliamentary standard from the available coal supply. They must supplement it in some way or other. In London, for instance, 16-candle gas was the quality required; but the late Dr. Letheby said that 14-candle gas was the proper quality for London. One could not get 16-candle gas from the available coal supply. The sea-carriage rendered Durham coal so much cheaper that they were obliged to use it. But they could not get the quality out of it; and therefore they were obliged to adopt various methods of enrichment. The old method was a mixture of a certain percentage of cannel; but, owing to the store diminishing and the demand increasing, the price had become prohibitive. Then the process of enriching by petroleum spirit was introduced; but this was expensive and uncertain, because it was found that it did not always carry all over the district. Then there was the making of oil gas in separate retorts, to mix with the coal gas as it was made. This was satisfactory so far as it went; it produced a good gas, and a permanent enrichment. Lastly, there was carburetted water gas; and he thought he was perfectly safe in saying this would never have been introduced, but for the necessity of increasing the illuminating power of coal gas. At present his Company used petroleum spirit and a little cannel for enrichment; but he believed they would have to come to carburetted water gas, though they had not done so at present. Labour difficulties, too, had entered into the question very decidedly since the great New Unionist upheaval in 1889. In the case of Liverpool, he had it from the Gas Engineer (Mr. William King) that they had not adopted water gas because it was cheaper, but for two special reasons—one was to bring the coalowners to their senses by checking the rapid increase in the cost of cannel; and the other to act as a salutary check on the demands of labour. In these directions, Mr. King said, they had derived distinct advantages, which fully justified the use of carburetted water gas. With this gas, the labour did not exceed 1½d. per 1000 cubic feet; while with coal gas, it amounted to 4d., and in some instances to 4½d. Other reasons for adopting water gas were that it took coke off the market, and also tar by decreasing its production. In one sense, these arguments were in favour of the gas companies; but, owing to the sliding-scale, they were also to the interest of the consumers. For every £7000 a company could save, £6000 would go to the consumer in the way of a reduction in the price of gas, and £1000 to the shareholders; so that he considered the use of carburetted water gas would be an advantage to the consumer by diminishing the price of gas, and to the shareholder by raising his dividend. He admitted that his Company had succeeded in paying a good dividend without using carburetted water gas; but they might have to come to it. As to the argument that carburetted water-gas plant could be brought into operation much quicker than coal-gas plant, to meet variations in the demand, such as a sudden fog, he said this was true, but there was really not much in it, seeing that, so far as water gas was used here, in the winter time the plant was all in operation. If, therefore, an extra pressure came upon the gas companies, the water-gas plant being in full operation, they must fall back on the coal-gas plant. Water-gas plant could be got to work in a few hours instead of the couple of days required for coal-gas plant. It being pointed out that if, in the case of a sudden demand, the maximum water-gas producing power was put on, there might at times be a larger proportion of water gas present in the mixture than there would be on the average of a whole quarter's working, witness agreed, but, he added, the companies had not at present any reserve in winter, though in summer they might have. In this connection he mentioned that the Tottenham and Edmonton Gas Company used about 56 per cent. of carburetted water gas the previous half year. Turning to the objections to water gas, he said there were, first, one or two minor ones. The specific gravity was considerably greater; and therefore, in its distribution, either larger mains or a greater pressure was necessary. But this, of course, was clearly a matter for the gas company only. Then carburetted water gas gave a smaller flame; but the public got the same amount of light as with a coal-gas flame of greater length. Mr. Joseph Cash, the Engineer and Manager of the Brighton Gas Company, had shown him some fish-tail burners on which there was a deposit of carbon from the use of water gas. At Brighton they made about 20 per cent. of water gas. The only real objection to water gas was the carbonic oxide, the percentage of which was 28, and not exceeding 30. He was not prepared to say that anything more than 10 per cent. of carbonic oxide was objectionable. Carburetted water gas had quite as strong and pungent an odour as coal gas. Theoretically carbonic oxide killed quicker; but if anyone went to sleep in a room in which gas was escaping, it would matter very little whether he was breathing ordinary coal gas or carburetted water gas. Certainly he did not think that the difference in the poisonous character of water gas compared with coal gas was sufficient to make a strong objection to its use. As to the cost of manufacture, the South Metropolitan Gas Company's works being on the river, they could get coal cheaper than, for instance, the Tottenham Gas Company; but if coal had cost 2s. per ton more, his Company would have been forced to make water gas. At Beckton it was cheaper to make coal gas on account of the water carriage; but at Tottenham it was cheaper to make water gas. His reason for not adopting it was not because of any objection to its poisonous character. One reason was the difficulty of mixing it with the ordinary gas. The Company had six stations; and they would have to have a separate water-gas plant at each. Asked whether he would see any objection to supplying carburetted water gas in a pure state containing 30 per cent. of carbonic oxide, witness replied that he did not think it would make much difference. A very small escape of gas would cause a strong odour over a whole room. He had smelt gas in a sitting-room which he had found escaping from a very tiny hole—a hole making barely a half-inch flame—or even a mere speck. This would not be dangerous; but it would be smelt. He had heard of explosions being caused by gas escaping from fractured street mains, and there might have been cases of suffocation, but he did not remember them. The general cause of death by gas was through burners being left turned on in bedrooms. Filtering through the soil would not deprive gas of its odorous properties. If the escape was likely to be dangerous, it would find its way out somewhere, and make itself perceptible by the smell. Having referred to the fact that, where water gas was used, it prevented the deposition of naphthalene, witness was taken back to the question of the illuminating power of gas. Upon this he insisted that, in the interests of the consumer, the candle power ought to be the highest and the best that could be obtained from the available supply of coal. It was a mistake to require it to be an enriched gas; enrichment costing more per candle than it was worth. A gas of 14-candle power could be produced at a certain price; but if the illuminating power was increased 2 candles, the cost was greater in proportion. With water gas the reverse was the case; and the lowest quality that could be made economically was 22 candles. A question was put to witness as to the extent to which, if the public used the incandescent method of lighting with unenriched water and other gas, the price of the gas could be reduced, he replied that his Company now charged 2s. 3d. per 1000 cubic feet; and he did not think any of these things would effect a reduction to less than 2s. It was pointed out that the carburetting of water gas was responsible for 7d. out of the total cost of 1s. 1d., upon which witness remarked that, if all the light obtained from gas was by means of incandescent burners, then water gas pure and simple could be used; and the price could be reduced about one-half. But if uncarburetted water gas was used, some means of giving it a pungent odour must be adopted; and this could be done at a nominal price. As to the condition of the pipes in the poorer houses in London, he said it was only during the last five years or so that gas had been used in them to any extent; and, under the prepayment system of supply, the Companies maintained the fittings. If there were escapes, it would be a good thing to strengthen the smell of the gas, so as to render the leakages unendurable. This led to the inquiry as to whether witness did not think the companies might arrange an occasional contamination of the gas with something that smelt very strong, in order to test the fittings. He charily replied that he did not know; but added that if they sent out a very noxious gas, they would have no end of complaints—the consumers would not blame their fittings, but the gas. He was of opinion that there were many leaks in houses; but they were not sufficient to cause the carbonic oxide in the gas to be dangerous—the quantity escaping per hour would do no harm whatever.

The next witness was

Dr. Frank Clowes, *Chemical Adviser to the London County Council.*

He prefaced his evidence by explaining that his appearance there was rather personal, and that the official views of the Council might be communicated later. Proceeding, he said he had made no experiments of his own as to the proportions of carbonic oxide that were dangerous. There could, however, be no doubt as to the danger of carburetted water gas being increased in proportion to the larger amount of carbonic oxide in it. While coal gas contained only one-twentieth of its volume of carbonic oxide, water gas contained 40 per cent., and carburetted water gas about 27 per cent. He had never known the carbonic oxide in coal gas to vary widely from 5 per cent. He understood from experienced gas managers in London that the highest proportion of carbonic oxide in their enriched gas was 17 per cent.; and the carburetted water gas and coal gas would be in the proportion of about half and half. The gas supplied by one of the Suburban Companies contained 50 per cent. of water gas; and the Manager assured him that this was the largest amount mixed with coal gas in this country. The Manager referred to had been using the mixture for six months, and intended to continue to do so. As regarded the evil effects of water gas, he said its action was more decisive than that of ordinary coal gas, judging from his experience. In the case of water gas, a man fell suddenly; whereas with coal gas the effect came on quite gradually. A gas containing 17 per cent. of carbonic oxide must decidedly be more poisonous and objectionable for use in case of an escape than ordinary coal gas, seeing that there would be three to four times the quantity of carbonic oxide in the escaping gas. In order to prevent risks from escapes, he advocated a proper inspection of the gas-fittings in each house when first laid, and then periodically. The necessity for this would be greater if water gas was used than in the case of ordinary coal gas. He was not, however, prepared to offer an opinion as to whether such an inspection should be made by an officer of the gas company or by an independent authority. Asked whether he went so far as to say that 17 per cent. of carbonic oxide was a serious objection to the use of carburetted water gas, he said he found no records of accidents arising

* It must be remembered that this evidence was given nearly twelve months since.

from the use of such a gas in this country or in America; but it seemed remarkable such accidents were not on record. The rapidity with which danger would arise in the case of an escape in a room was certainly greater with carburetted water gas than with coal gas; and the difference in rapidity would be proportional to the increased amount of carbonic oxide contained in the gas. It was true that, in notes he had submitted to the Committee, he said that restriction or regulation might be unnecessary if the proportion of water gas did not exceed 25 per cent.; but he suggested this figure as an upper limit, and the question of proportion was open to discussion. It seemed to him that 25 per cent. was a practical limit in the case of gas used for domestic purposes; and a limit of that extent would exclude the use of carburetted water gas pure and simple in houses. As to the case he had quoted in which carburetted water gas was present in the supply to the extent of 50 per cent., he said that 50 per cent. of carburetted water gas would not be beyond the range he had indicated, as it produced a mixture containing only the same total amount of carbonic oxide as coal gas containing 25 per cent. of water gas did—that was about 16 per cent. A remark by Mr. Cunynghame that he fancied the smell of carburetted water gas would vary very much with the hydrocarbons used to enrich it, elicited from witness that he had not heard of any difference in this respect between sample and sample. In passing through the pipes or through earth, some of the odour would be deposited. For example, with a broken main under a house, the gas would lose its odour if it passed through a sufficient thickness of suitable soil. The smell being due to the enriching substance, it would, of course, increase with the richness of the gas. Accidents were more frequently caused by the meter having been shut off while gas-taps were open, or to the gas being extinguished by water in the pipes, and the gas subsequently passing out at the open tap, than by persons leaving gas-taps turned on. Leakages due to defective pipes might certainly be large enough to give rise to danger in a small unventilated room. It was only a question as to the amount of the leakage in relation to the cubical capacity of the room, and the adequacy of the ventilation provided. Most bedrooms were unventilated.

The proceedings were resumed on Wednesday, March 16, when the only witness under examination was

Dr. TATHAM, *Statistical Superintendent of the General Register Office.*

He informed the Committee that the term water gas had not yet appeared in the returns of the Registrar-General; but the terms "carbonic oxide," "carbon monoxide," and "coal gas" were used at times as causes of death. The certificates, of course, came from the coroners. He had examined the returns for the past ten years; and 147 deaths in the aggregate were returned as from coal gas and carbonic oxide poisoning. This number did not include any of the deaths which were attributed to "suffocation" merely, and a certain portion of which might, in reality, have been due to poisoning by coal gas or carbonic oxide. The coroners' certificates did not always give information on this point. He had tabulated the deaths under the two headings of "coal gas" and "carbonic oxide" for the last ten years. [Witness handed in the particulars, which were given in Appendix III.*] He had been much hampered by the wording given in the coroners' certificates; but he had done the best he could with the material at his disposal. None of the carbonic oxide cases in 1896 were due to escapes from which the public would suffer; and therefore any ordinary cases of poisoning by water gas must be included in the "coal gas" or general "suffocation" returns. It might be worth while to try and get further information regarding the "suffocation" cases from the coroners; and he thought it would be in the interests of public health if the Registrar-General could go to the coroners and ask for additional information for purposes of registration. He was surprised to find that so dangerous a gas as water gas was distributed to the public without warning. The returns showed a greater number of deaths during the last five years than for the first five. Of course, the returns were for the whole of England and Wales; and from so few deaths he should not like to draw the inference that the increase arose from the use of water gas. If they could examine into the deaths from suffocation, it was very likely that the features of his table would be altogether altered. He might also suggest that, although only comparatively few deaths were registered as from carbonic oxide poisoning, the number of cases of serious illness not leading to death might nevertheless be very considerable.

The fourth sitting was held on Wednesday, May 4, when two witnesses tendered evidence. The first was

Professor VIVIAN B. LEWES, *Superintending Gas Examiner to the Corporation of the City of London.*

In corroborating what had already been stated as to the circumstances which led to the introduction of water gas into this country, he alluded to the visit to America in 1889, of Mr. G. C. Trewby, of The Gaslight and Coke Company, for the purpose of investigating the question of the supply of carburetted water gas, and to the subsequent erection of a plant at Beckton on the improved Lowe principle. In 1891 the Company began to mix carburetted water gas with the London coal-gas supply; and during the last few years all the supply of London north of the Thames (except within the district of the Commercial Gas Company, who had only lately adopted it) had contained practically about one-fifth of its bulk of carburetted water gas. Owing to witness's position as the Chief Gas Examiner to the City Corporation, he had been watching the proportion of water gas which was put in to the supply, and had come to the conclusion that a certain proportion was perfectly harmless—that the risk was practically no greater than with coal gas *per se*. But had the percentage of carbon monoxide risen beyond a certain pitch, he said he should at once have taken steps to report the matter to the Corporation, and bring the question to a head. It might be taken that for the last five or six years the carbon monoxide had been at a steady average of about 9 per cent. Taking that year alone [1898], he had eleven analyses of the gas on various dates between Feb. 14 and April 29—viz., 8·82, 7·77, 7·94, 8·4, 8·33, 8·59, 7·47, 6·4, 9·03. These were the percentages of carbon monoxide in the whole of the gas, taken on different days. Therefore he did not think there was any reason to suppose that, owing to any pressure on the Gas Companies, and a larger consumption on some particular days, there might be a very much larger amount of carburetted water gas used than these averages; and for this reason: Once a month at least, he had analyzed the gas, and only on one occasion had he found the carbon monoxide as high as 12 per cent. The samples were not taken at any particular time of the day. He could not be absolutely certain that he had taken a sample during a fog; but he believed that the occasion on which 12 per cent. was found was after a heavy fog. Asked whether he had formed any definite opinion as to what percentage of carbon monoxide was a safe one to allow, he said he had; and the limit which he had fixed in his own mind, and which he had already advised the Corporation to ask for as an outside limit was from 16 to 17 per cent. This was more than he had found in the supply. At the present time, there were no regulations for testing the gas for its constituents; so that the tests which he had made had been purely for his own information. As for his reasons for giving the average he had done—in the first place, it was practically impossible for a man to be poisoned by carburetted water gas while he was awake; the smell of the gas was quite as pungent as coal gas, and one could detect by the nose one part in 10,000. This limited the question practically to night time. There were certain classes of accidents which led to escapes of gas which it would be no good legislating for. For instance, if a steam-roller smashed a main outside a house and the gas rushed into the cellar, this would bring about death from ordinary gas as it would with carburetted water gas. But what ought to be provided against was the escape from an ordinary gas-burner through some accident, such as one's sleeve catching in a loose fitting, naphthalene stopping the flow of gas for a moment or two, or a stoppage in the meter, or a big bubble of water collecting. In any of these cases the gas might be extinguished, and the flow of gas subsequently released without warning. He would take an ordinary bedroom, and suppose 1000 cubic feet would be the average size. Such a room would not have more than one burner, passing about 6 cubic feet of gas per hour. In such a room, the air would be changed at least twice an hour, if it had the ordinary ventilating arrangements—a fireplace, a window, and a door. Now, given the factors he had mentioned, they would find that, after three or four hours, they came to a constant, and would not get beyond that—that was to say, the rapidity with which the gas was taken out by a change of air would be equivalent to the leakage into the room. This constant was reached when they had 3 per cent. of gas in the air. The next thing was to say what should be the limit of safety with regard to carbon monoxide; and the data one had to go upon as to this were rather limited in character. His own experience was that 0·05 per cent. of carbon monoxide was a quantity which would affect one, but not very seriously even after a period of three or four hours. He knew that in an atmosphere containing 0·05 per cent. of carbon monoxide, he got a sharp frontal headache, but not anything much more serious. He therefore took 0·05 per cent. as his limit for the pure carbon monoxide. If they had got 0·3 per cent. of gas mixed with the air in the room, the amount of carbon monoxide which must be present in the gas to give 0·05 per cent. of the air was 16·6 per cent. It would take some three or four hours to rise to that, and then a man could be in that atmosphere for another three or four hours without anything worse than a bad head; and this he (witness) thought was about the right limit. He had never tried the effect of ordinary gas; but he should say that a person would get a bad headache with 0·3 per cent. present in a room. The amount of carbonic oxide was much less in coal gas—sometimes as low as 4 per cent.; and the injury from this would be practically four times less, but there were other things that would add to the effect. Supposing such a limit of carbonic oxide as he had mentioned were fixed, in an admixture of carburetted water gas and coal gas they might go up to as much as half of each without danger. He had reported to the Gas Committee of the City Corporation practically on the same lines as those he had followed in his evidence; and they had decided to ask that some limitation of this character might be placed on the amount of carbon monoxide. [Later in his evidence, witness stated that he was authorized to represent the views of the Corporation that such a limit should be fixed.] Of course, the limitation would have to be on the percentage of carbon monoxide in the mixed gases. In some of the northern towns where they use much richer coals (containing much more oxygen) than in London, there was a higher percentage of carbon monoxide in the coal gas. In Edinburgh, for instance, it reached 10 or 11 per cent. In some foreign cities, as in Berlin, they used to carbonize a brown lignite coal, which Professor Wurtz, on analyzing, found gave more carbon monoxide in the gas than there was in carburetted water gas pure and simple. Therefore with gas made from Durham coal, they could afford to mix a much higher percentage of carburetted water gas than they could with the gas made from the coal used (say) in Edinburgh. Answering a question by Professor Ramsay, he said he did not think the amount of carbon monoxide in coal gas was increased by high temperatures in the manufacture. By an analysis of London gas made by Dr. Edward Frankland in 1851, they would see he gave 8 per cent. of carbon monoxide for coal gas. At that time they were using iron retorts, and temperatures very different from those at the present day. They were then probably getting not more than 7500 cubic feet of gas per ton of coal carbonized; whereas, as a rule, 10,000 cubic feet were now obtained. It might be taken that 6 cubic feet of gas was a fair average

* APPENDIX III. noted in tabular form the deaths recorded in the registers as due to poisoning by coal gas and carbonic oxide. We give the total figures, and place in parentheses the number ascribed to carbonic oxide: 1887, 5; 1888, 13 (2); 1889, 12 (2); 1890, 8 (1); 1891, 16 (1); 1892, 11 (3); 1893, 23 (2); 1894, 16 (4); 1895, 20 (7); 1896, 24 (4); 1897, 28 (4). Most of these are shown to have been accidental cases; but included in the figures are a few suicides. There were two by coal gas in 1893, one in 1894, three in 1896, and two in 1897; and by carbonic oxide, two in 1892. There is also an analysis of the cases in 1896 and 1897; and it is seen from this that of the four cases attributed to carbonic oxide poisoning in 1896 not one was due to the ordinary gas supply—a cupola metal furnace, a brick kiln, defective apparatus at chemical works, and a cement kiln being the sources from which the carbonic oxide arose. Then of the four carbonic oxide cases in 1897, one was due to Dowson gas; the second to acute poisoning while testing a gas-meter; the third occurred at Leeds, but there is no further information; and the fourth was owing to exposure to carbonic acid and carbonic oxide in a coal mine. The appendix also includes particulars of eighteen cases of poisoning by illuminating gas brought to the notice of the Committee during 1898; but in only two was a verdict of poisoning by carbonic oxide returned, and in one accidental poisoning by water gas. The accidents at Belfast and Woolwich this year are also recorded.

passed per hour by a bedroom burner; and in taking the figures quoted into view, it must be borne in mind that the specific gravity of coal gas was ·4 to ·45; and therefore the person inhaling it, if he was in bed at a lower level than the gas-burner, would be getting a smaller quantity probably than would be represented by a perfect diffusion in the room. The specific gravity of carburetted water gas was greater than that of coal gas, but still far below that of the air. Questioned on the point as to escapes from street mains, he said he had never come across a case in which carburetted water gas had been deodorized. At the same time, it was perfectly conceivable that, in the case of a breakage of a main, there might be a considerable deodorization, owing to the passage of the gas through the soil. Referring to escapes from chandeliers, Dr. Haldane asked whether he rightly understood that witness thought the percentage of carbon monoxide in the gas would not much matter. To this witness answered that, if there was a large leakage of coal gas into a room it would be noticed very quickly; but if a person was asleep, it would be quite possible to be poisoned. Really these causes of accident were of extremely rare occurrence; and it would only be a luxurious person who would have a chandelier in his bedroom. His contention was that, if a person was asleep, and did not detect the smell of gas at once, the hydrocarbons in the gas, being credited with a slightly anæsthetic action, would make him sleep all the sounder while the gas was escaping. In considering a matter of this character, he did not think they ought to sail too close to the wind. Of course, a man would have a better chance of getting off with coal gas containing 4 per cent. of carbon monoxide than 12 per cent. In a tenement at Glasgow three or four years back, there were eight or ten persons poisoned. The end of a main was found to be practically unsealed; but that was coal gas. He had so far been unable to trace any statistics that would show that deaths from gas poisoning had increased in any way since the introduction of carburetted water gas. Witness was here interrogated at some length by Dr. Haldane as to his assertion that a No. 4 Bray's burner would only pass about 6 cubic feet of gas per hour, with the tap turned full on, and with a pressure of about 1 inch; and he adhered to the statement.* [Dr. Haldane mentioned that at Oxford No. 4 burners, at the lowest pressure measured there, passed 8·8 cubic feet when turned on full, and 11·3 cubic feet when the pressure was high.] Witness, proceeding, stated that his pressure-gauge was fixed between the tap and the burner. He believed that, as a rule, Nos. 4 and 5 burners were used—in fact, he once made an inquiry over a large district; and his recollection was that Nos. 4 to 5 amounted to 95 per cent. of the number employed. The limit of gas mixed with air which would form an explosive mixture was about 5 or 6 per cent.; and there would be no immediate danger to life from poisoning before the point was reached at which explosion would take place, neither from coal gas or carburetted water gas, unless breathed for some time. There was another case in Glasgow where people were found dead, and a lamp was still burning, which showed that they had been killed without the gas reaching an explosive point; but there the mixture had been inhaled for some time. Another point about carburetted water gas was that, when mixed with coal gas, it gave a smaller flame for the same illuminating power. A light of 22 candles could be obtained with a little over a 2-inch flame with carburetted water gas; whereas with coal gas he had found that in the London argand burner a 16-candle flame was practically 3 inches in height, and, when a light of 16 candles was emitted by a mixture of coal gas and water gas, the height of the flame was only about 2½ inches. His remarks did not apply to incandescent burners; but the mixture of carburetted water gas was, if anything, better for the mantle. Asked if it was to be understood that he had come to the conclusion that it was safe to recommend that something over 16 per cent. of carbon monoxide could be used in gas for ordinary lighting, witness said he should prefer to put it this way—that under no circumstances should more than 16 per cent. be allowed. A number of questions were then put as to the use of uncarburetted water gas for manufacturing and other purposes. Replying, witness stated that at present, so far as he knew, it was only used at one or two places where the work was of a special character, and an intense heat was required. It was probable, however, that certain modifications of uncarburetted water gas might bring it into greater use. By the old processes employed in making it, only 34,000 cubic feet were produced from a ton of coal; whereas by certain modifications in the process, double this amount could be obtained—that was, something like 72,000 feet of water gas per ton; and this meant that they could get nearly 80 per cent. of the energy of the coal into the gas, whereas with the old water gas only half the quantity was obtained. Having no smell, this uncarburetted water gas was, of course, far more dangerous. But there would be no difficulty in odorizing it, though it would tend to hamper it for manufacturing purposes. It would entail a certain amount of cost; and the scent itself would have some slight action on the engines. He would not say that the small amount of expense in making the gas smell would prevent its use. The cheapening of the gas would make it very valuable for gas-engines; and, if proper fittings were used, he did not see that it would be very dangerous to employ it unodorized. Turning to the question of illumination, witness said as much light could be obtained with water gas as with ordinary coal gas from certain forms of incandescent mantles. He had realized as much as 19 candles per foot of water gas from a specially long mantle. For outside lighting, this would be most valuable. If a gas-works converted all their coke into water gas, and used this water gas for power to generate electricity, and also for road lighting by means of mantles, it would bring the cost of street lighting down to a point at which electricity could not possibly compete. He had seen uncarburetted water gas so used at Essen. Dr. Haldane inquired if it did not strike witness as a serious disadvantage that the pipes conveying this water gas to the public lamps must be laid in the streets, and that a leak might be exceedingly dangerous, to which he replied that, for outdoor work, he did not see any serious objection. The proportion of carbon monoxide in pure water gas was about 10 per cent. greater than in carburetted water gas. In further reference to the use of the gas in manufacturing operations, he said it would be a severe tax on industry if there was any restrictive legislation.

The mass of evidence which had been taken in favour of water gas was at this stage diversified by the examination of

Dr. C. D. HILL DRURY, *of Darlington.*

This witness was one of the leaders in the movement made some time since by the medical practitioners of Darlington against the introduction of water gas by the Corporation. Their objection, he said, was simply on account of the large amount of carbonic oxide in carburetted water gas. Ordinary coal gas contained 4 to 5 per cent.; whereas in carburetted water gas there was 35 per cent. or more. He admitted that, with complete combustion, there would be no more danger in carburetted water gas than in coal gas. The danger was in escapes; and what they contended was that there was not sufficient control over the amount of carbonic oxide which could be mixed with the gas, and that, unless everyone's gas-fittings were in thoroughly good order, it would be impossible to prevent the chances of poisoning. They did not say that the carbonic oxide in the gas would necessarily mean that there was greater danger of death, especially if it was properly controlled; but they did contend that an amount of carbonic oxide which need not produce serious consequences would yet produce results inimical to health. Carbonic oxide was much lighter than the atmosphere; and therefore was easily diffusible. An escape of gas might be so small that it could not be easily detected; but, if it contained a large proportion of carbonic oxide, it would produce bad effects. This appeared to surprise Lord Belper, who put the question: "You don't mean to say that an escape of gas which cannot be smelt is injurious to health?" and witness merely replied "No." Water gas had not been introduced into Darlington; it was only a proposal of the Gas Committee, who contemplated mixing 25 per cent. with the coal gas. He could not tell the proportion of carbonic oxide in Darlington coal gas; but he presumed there would be 9 or 10 per cent., which would give about 15 or 16 per cent. in the mixture which it was proposed to supply. He thought that the increase from 10 to 15 per cent. was so serious a matter that it ought not to be allowed. There would be considerable difficulty in regulating the percentage of water gas; and there was no law to prevent the Gas Committee increasing it. Darlington was especially subject to anæmic conditions and to states of physical depression, which continued to affect the people even after long residence; and they felt that any increase of carbonic oxide in the gas might materially add to these unhealthy conditions. The combination of carbonic oxide with the hæmoglobin of the blood was very easily effected. It displaced the oxygen and gradually destroyed the oxygen-carrying effect of the hæmoglobin; and therefore produced a very deteriorated condition of health. In his opinion, a 10 per cent. limit of carbonic oxide was enough. It was in consequence of the protest of the medical men (who were practically unanimous) that the Darlington Corporation were not now going to introduce carburetted water gas. He was aware it was being distributed in other towns; and he had evidence of its disadvantages. Even 0·02 per cent. of carbonic oxide in the air would produce, if continuously inhaled, very serious symptoms. It would become a case of chronic poisoning. He did not think those producing water gas had ever looked at the question of chronic poisoning, which he thought as serious as acute poisoning. Chronic poisoning reduced the power of the hæmoglobin to carry the oxygen to the other parts of the system; and it produced depression of spirits, headache, neuritis, sometimes nerve symptoms, and even more serious conditions. The ordinary number of corpuscles in the blood was between 3 and 4 millions per cubic millimetre; and carbonic oxide would reduce them by at least 100,000 corpuscles in a millimetre. Respecting the deleterious effects, and especially chronic poisoning, it was asked of witness whether it would be difficult to prove if these things were due to carburetted water gas or ordinary causes; and he rather evasively replied "unless we had suspicions sufficiently strong to examine the blood." In his opinion, the question of the leakage of gas was sometimes lost sight of in this connection. The Chairman of the Darlington Corporation Gas Committee had stated that 7 per cent. of gas was lost between the works and the consumers' meters; and then there was also "great loss" in the house fittings. A 10 per cent. limit of carbonic oxide would be a fair one; but even then he thought the gas ought to be thoroughly analyzed from time to time. The Corporation, being the gas authority, should not appoint the analyst; but the Home Office should do so. The reasons given for the introduction of carburetted water gas showed the necessity for the limitation of carbonic oxide. One was that it was quickly available. If so, there would be a great temptation to put more of the gas in the supply than was proper. Then it was said to be an assistance in time of strikes. At such times, he inquired, were consumers to have nothing but carburetted water gas sent into their houses? It was pointed out to witness that the symptoms of which he had been speaking were common to many other causes than carbonic oxide. So were the symptoms of most diseases, he replied. Patients who had suffered in the way he had described on being taken away from the "gassy" room in which they had been had recovered. That was to say, remarked Dr. Haldane, that there was something in the room which made them unhealthy; but, he asked, had blood been examined to show that that something was carbonic oxide. Witness answered that it had; but pressed to quote cases, he said the text-books said it had been done. Dr. Haldane, however, declared that they gave no evidence that there was such a thing as chronic carbonic oxide poisoning. Have you, the Chairman pointedly asked, anything to show that these so-called cases of chronic carbon monoxide poisoning are really cases of poisoning from that cause, as distinct from any other products of the gas? Witness replied: I should not like to say that. I could give you no cases of my own where the carbon monoxide has been proved to be the absolute cause. Said Dr. Haldane: That is just the point which is before the Committee. In the last portion of his examination, witness's theories certainly did not show to much advantage. He was asked by Dr. Haldane whether he had ever considered the case of the men working on the Metropolitan Railway, who were exposed to carbonic oxide during the whole of their working hours, and yet were healthy. His reply was that it had never been brought to his attention before; and he returned the inquiry by asking whether the air on the railway had been shown to contain a large quantity of carbonic

* Witness subsequently reported that he had tested eight ordinary No. 4 Bray burners bought at a gasfitter's without any selection, and found that, with the tap full on under the "normal pressure"† of 1 inch, they passed when lighted from 5·3 to 5·8 cubic feet; the mean of the eight tests being 5·45. At the same pressure with the tap full on, and the gas escaping unlighted, they passed from 5·9 to 6·3 cubic feet; the mean of the eight tests being 6·06 cubic feet per hour.

† Observations taken for the Committee at the Home Office and elsewhere in London showed that the night (or lowest) pressure in the ordinary supply varied between 2 and 3 inches.

oxide. Dr. Haldane answered that it always contained some. So do coal pits, voluntarily observed witness, upon which Dr. Haldane pertinently asked whether that would not tell against witness's theory, seeing that colliers were one of the most healthy classes of men. "Yes, it would," answered witness; but, qualifying it, he added "there is too small a quantity there." The arguments continued in the same strain; and the Chairman closed the discussion by telling witness his statements were surmises on his own observation, and had not been scientifically proved. But witness clung to the opinion that his evidence was conclusive.

(To be continued.)

REPORT OF THE SOCIETY OF ARTS COMMITTEE ON ACETYLENE.

Our readers will doubtless remember that about this time last year a project was set on foot for holding an exhibition of appliances for the generation of acetylene gas; and in the "JOURNAL" for April 26 we were in a position to announce that the Council of the Imperial Institute had consented to allow the building and grounds to be used for the purpose, and the Council of the Society of Arts had appointed a Committee to settle the conditions under which the apparatus should be admitted. This Committee was constituted as follows: Major-General Sir Owen Tudor Burne, G.C.I.E., K.C.S.I. (Chairman); Sir Frederick Bramwell, Bart., D.C.L., F.R.S.; Professor James Dewar, M.A., LL.D., F.R.S.; Mr. H. E. Jones, M.Inst.C.E.; Professor Vivian B. Lewes, F.I.C., F.C.S.; Professor Boverton Redwood; Professor W. C. Roberts-Austen, K.C.B., F.R.S.; Professor J. M. Thomson, LL.D., F.R.S.; and Sir Henry Trueman Wood, M.A. (Secretary). The exhibition was opened on the 15th of June, and closed on the 15th of September; and the various exhibits were noticed in articles which appeared in the "JOURNAL" from time to time in the interval. The report of the Committee, which has been awaited with not a little interest, has now been published. It bears the signatures of all the members of the Committee, and is as follows:—

It being common knowledge that among the large number of generators constructed and sold to the public there were some which did not conform to the ordinary conditions of safety, it was felt that, in undertaking an Exhibition of Generators for Acetylene to be held at the Imperial Institute, a preliminary test should be made of all the generators submitted for exhibition, and that the generators which did not satisfy the necessary conditions should be rejected.

The London County Council generously placed at the disposal of the Committee premises in the Harrow Road, where the preliminary tests of all the generators submitted were carried out; and the various forms of apparatus as they were passed having been forwarded to the Imperial Institute, the Exhibition there was opened on June 15, 1898.

Although beyond the scope of their instructions, your Committee felt that, in the interests of the public, it was advisable to carefully test the various forms of generator working for the period of a month, as it was possible that defects which might not be apparent in the test extending over a few hours might be detected on working over a longer period.

Professor Vivian B. Lewes and Mr. Boverton Redwood were appointed as a Sub-Committee to examine into the working of the acetylene generators exhibited at the Imperial Institute, and to report to the Committee as to the results obtained and as to the generators to which certificates should be granted.

As the result of these tests, the Committee advised the granting of certificates for those forms of acetylene generators of which a list is appended; the certificate, however, merely setting forth that the generator had complied with the requirements of the various tests to which it had been submitted, and had worked safely and satisfactorily during a month's everyday use.

The exhibition at the Imperial Institute has clearly demonstrated that many types of acetylene-gas apparatus can be so constructed as, with ordinary precaution, to be absolutely safe, and that lighting by acetylene need be no more fraught with danger than are any of the other forms of artificial lighting in general use.

In granting certificates to the various makers of apparatus hereinbefore mentioned, we wish it, however, to be clearly understood that such certificate can only apply to the type of machine examined and tested by us, and must not be taken as applying to all and every class of machine which may be offered for sale by the same makers.

We consider that the various makers of apparatus who, at so early a period in the development of acetylene lighting, submitted their machines to the rigid tests as to safety laid down by your Committee, and have obtained certificates, are entitled to the first consideration from the public.

There may be other forms of generators not exhibited at the Imperial Institute which are perfectly reliable; but we strongly recommend that no machine should be purchased from any maker or dealer unless a certificate can be shown from some competent authority to the effect that it complies in substance with the rules laid down, and that it has been submitted to, and has satisfactorily passed, the tests. In this respect, fire insurance companies could render great assistance to the public in refusing to insure without such certificate being forthcoming.

All the machines to which certificates were granted worked satisfactorily—some better than the others. It is only fair to state that in the few instances where shortcomings are indicated the defects were in many cases remediable, and that possibly, owing to the experience gained by the exhibitors during the testing period, they may have since been remedied. Apparatus, therefore, should not be condemned because during the trials the working in any particular case was not all that could be desired.

A point of considerable interest is the volume of acetylene gas produced per pound of carbide used in each generator. Among the automatic generators, there were three which gave over the whole of the testing period an average of slightly more than 4·5 cubic feet per pound; the remainder varying from slightly under 4·5 to as low as 3·55 cubic feet. Among the non-automatic generators, one gave an average of about 5 cubic feet—the others showing much less. The carbide of calcium used both at Harrow Road and at the Imperial Institute was supplied in bulk by the Acetylene Illuminating Company, Limited, from Foyers, and was found to be throughout of excellent quality.

Although it does not follow that the generator which yields the largest amount of gas is necessarily the best, yet this factor is a most important one in the choice of any apparatus. The generators which combine the largest yield of gas with strength of material and simplicity in charging the carbide and in emptying the residue are those which will recommend themselves to the public. Where the public are most likely to be misled is by the exaggerated claims made by makers as to the number of lights which a given machine will supply; and herein may possibly be an element of danger due to excessive heating caused by too rapid generation. Even if there be no danger, the overheating will considerably lessen the quantity and lower the quality of the acetylene gas evolved from the carbide, as well as tend to cause smoking of the burners. We recommend that every apparatus sold should be accompanied by a written guarantee that it will light a specified number of burners, consuming a given quantity of gas per hour, over a consecutive number of hours, without increasing the temperature in any part of the carbide receptacle above 228° C.—that is to say, the fusing-point of tin.

In regard to precautions to be taken, we endorse the suggestions of the Public Control Department of the London County Council and of the Corporation of the City of London.

As to licences for storing carbide of calcium, we consider that Local Authorities need have no hesitation in granting such licences for storage, provided it be shown to their satisfaction that the material is properly packed, and that it is intended to store it in some dry and well-ventilated place. We consider that no carbide should be purchased without a guarantee that it is free from any impurities in quantities sufficient to cause danger, and the name and address of the manufacturer should be given on each package. It should also be guaranteed to give off an average of 5 cubic feet per pound of carbide when used in a good generator. The Home Office regulations allow 5 lbs. of carbide to be kept without a licence in packages of 1 lb. each. We recommend that, however small the quantity, it should always be kept in closed tins or bottles, under lock and key, and in a dry place. When its properties are more fully known, these precautions may not be necessary, as it is no more dangerous than many other substances in daily use.

It was not within the scope of the work of the Committee to report upon portable apparatus and lamps to be used within the house. Your Committee, however, feel it their duty to state that, safe as they consider acetylene gas to be, when generated in a properly constructed apparatus outside the building to be lighted, and in accordance with the rules and suggestions contained in this report, they are of opinion that the generation of gas within the house is not unattended with danger, except in skilled hands. As to cycle lamps, carriage lamps, &c., though requiring only small charges of carbide, we consider that great care is required in their manipulation.

We consider that non-automatic generators with a holder capable of taking the gas generated from the largest charge of carbide the generator will hold, are free from objections attending all automatic generators examined by us; and we are of opinion that every generator should be fitted with an arrangement by which all air can be rinsed out of the generating-chamber by acetylene or some inert gas before action is allowed to commence between the water and carbide. We are also strongly of opinion that every generator should be fitted with a purifying chamber or chambers, in which the acetylene is purified from ammonia and sulphuretted and phosphuretted hydrogen and other impurities.

The following is the list of firms, referred to in the report, to whom certificates have been granted:—

Automatic Generators.—Abingdon Acetylene Illuminating Company, Limited; Acetylene Beacon Light Company, Limited; Acetylene Gas Corporation, Limited; Acetylite Syndicate; Appleby and Harris; Bailey and Clapham; British Acetylene Gas Generator Company, Limited; Ehrich and Graetz; Exley and Co.; Sir Charles S. Forbes, Bart.; International Industrial Syndicate, Limited; Liver Acetylene Gas Company, Limited; Manchester Acetylene Gas and Carbide Company, Limited; Midland Acetylene (Parent) Syndicate, Limited; Read Holliday and Sons, Limited; Sardi's Patent Gas Generator Syndicate, Limited; Strode and Co.; Thorn and Hoddle; Thornton-Scarth Automatic Lighting Syndicate, Limited.

Non-Automatic Generators.—British Pure Acetylene Gas Syndicate, Limited; Ideal Gas Company, Limited; Pintsch's Patent Lighting Company, Limited; Sunlight Gas Company, Limited (Goodwin's System).

The report is followed by seven appendices, the first of which consists of the above list of firms who have obtained certificates, a copy of which is given in the second. The others furnish particulars as to the origin of the exhibition, the rules for the admission of apparatus, the various appliances shown, the methods of testing adopted, the results of the experiments, as reported upon by Professor Lewes, and the legislation relating to calcic carbide and acetylene.

Earls Barton Water Supply.—A proposal of the Wellingborough Rural District Council to borrow £1000 for works of additional water supply for the parish of Earls Barton formed the subject of a Local Government Board inquiry by Colonel Hepper last Friday. It is proposed to lease from the Marquis of Northampton the Debdale spring; and provisional leases have been prepared. It is to meet the attendant expenses that the above-named amount is required.

The Gas-Works Purchase Question at Rushden.—As long ago as the year 1894, the question of purchasing the undertaking of the Rushden Gas Company was brought to the attention of the Rushden Urban District Council; but, although it was then possible to acquire the works at a comparatively small cost, the opportunity was not embraced. In the meantime rapid extensions have taken place, and the value of the undertaking has been increased until at present it is £60,000. This sum seems to be regarded as prohibitive, for at the ratepayers' meeting last Tuesday to consider the question there was a majority against purchase, solely on account, apparently, of the large amount which would have to be raised to acquire the works. At the meeting of the District Council on the following day, the Chairman (Mr. J. Claridge) reported the result of the town's meeting on the gas question; and, after a few remarks by the members, the subject dropped. At a meeting on the same day at Higham Ferrers, the townspeople took with unanimity the same course.

LIVERPOOL UNITED GAS COMPANY.

The Half-Yearly General Meeting of this Company was held last Tuesday—Sir EDWARD LAWRENCE in the chair.

The SECRETARY (Mr. P. H. Garnett) presented the report of the Directors for the half year ending Dec. 31, which set forth the amount of the dividend they recommended to be paid.

The CHAIRMAN, in moving the adoption of the report, stated that, as this was the half-yearly meeting, there were no accounts to submit. In regard to the working in the six months ending the 31st of December, he did not think it would have been possible for them to anticipate such successful results as had been obtained. This satisfactory state bade fair, so far as they could at present see, to be continued throughout the half year on which they had entered. In spite of all the difficulties they had had to contend with in regard to competition in other quarters, the consumption of gas went on steadily increasing; and he was not very far wrong when he said that the consumption for the six months terminating on the 31st of December exceeded that of the preceding period by nearly 3 per cent. This was a very large and important accession to their production, and during the current half year, up to this time, he supposed the increase was even greater than that. He might say with respect to the strains that were at times imposed upon them, that in one week they actually had an increase of 13 per cent. over the corresponding week of last year; and this in the depth of winter meant a very large amount. The position of their property to-day was as good as it had ever been in the past, so far as the question of consumption and competition with the electric light was concerned. The Committee of experts appointed by the Home Office to inquire into the question of water gas had just issued their report. In what he said with regard to this report he wished to speak with a due sense of the responsibility which lay upon him as Chairman of the Company, and also upon the Directors, to do nothing which would tend to injure the health of the inhabitants of Liverpool or of the gas consumers. He wished always to speak without any feeling, as far as he possibly could, towards those who at times treated the Company very unjustly and very unfairly. He did not want on this occasion to enter into any arguments with such people; but he desired to give the shareholders a calm and unbiased view of the position of things at the present moment. The first important statement in the report was that "carbonic oxide ranks amongst the most dangerous of poisonous gases known." In this fact lay "the *primâ facie* reason for apprehending danger from the extensive use of carburetted water gas." The Company never disputed this question. They were perfectly aware of it; and there was nothing in the statement to astonish them, or that need alarm anyone who read it. What they had maintained, and what they maintained still, was that the Company were supplying a material containing such a quantity of carbonic oxide as would not, in the ordinary course of things, prove in the slightest degree deleterious to health; and the report just issued by the Committee fully bore out this view. It was only right that the public should have their attention drawn to what was said by the Committee, so that their minds, which had been disturbed by various statements made from time to time, might be reassured. The Committee stated that, as regarded the use of the gas, "the circumstances under which carburetted water gas may be seriously dangerous are comparatively few. Danger arises only when the gas escapes unconsumed; for when burned in the ordinary way the products of combustion of carburetted water gas are no more unhealthy than those of coal gas. He wished the public to take due note of this, because the opposite had been asserted and repeated frequently in the town. The Committee further stated that "in the daytime the amount of carbonic oxide is not of serious consequence. An escape of carburetted water gas is as easily detected as one of coal gas, and, except in very special circumstances, can be avoided or remedied long before the atmosphere is in the least degree poisonous. Even at night, very slight escapes of an ordinary character—caused, for instance, by imperfections in the joints of fittings, do not appear to us to be rendered more formidable by the introduction of carburetted water gas." This was an important matter, because they had been told that carburetted water gas, with those little escapes which were constantly arising from imperfect fittings in the house, would become so dangerous as to involve peril to human life. The Committee went on to say: "It is practically impossible for a really poisonous atmosphere to be produced by such escapes; and though it is evident that constant exposure to small leakages of gas may be to some degree prejudicial to health, we do not think that the existence of anything like chronic poisoning by carbonic oxide has been established." He hoped, therefore, that the gas consumers of Liverpool would not think anything was being done that could prejudice their health or lives. Of course, they were always liable to accidents; and this would be the case as long as human nature was what it was. But the Gas Company were not to blame because a man chose to blow out his light, and leave his gas escaping all night, with the consequence that he was a corpse before morning; nor did he think the public would hold that what had been proved to be a very valuable and useful article of life was to be deliberately set aside, and the use of it forbidden, because some few people were careless, and did things which led to their own destruction. The Committee also referred to the possibility of carburetted water gas being used for the purpose of committing suicide, and even murder. He confessed that he could not quite follow the reasoning of the Committee in this respect, because if this were carried out logically it would involve a great deal more than was suggested in the report. If they were to put a stop to the possibility of people committing murder or suicide, he did not see where they were going to end. They would have to barricade their canals and rivers, and even the shores of the ocean, so that people should not have the opportunity for getting into the water. That reasonable care should be taken in the use of all gases was but right; and if Parliament, in their discretion, chose to introduce legislation for the purpose of restricting the extent of the use of carburetted water gas, the Company had only to bow to their decision, and carry out their wishes in the matter. The Company were perfectly prepared to fall in with whatever might be required of them; but they said they had done nothing that anybody could reasonably complain of, and nothing prejudicial to public health. He was sure the Directors had it upon their consciences that they were always endeavouring to faithfully discharge their duty; and whatever might be said by impassioned orators outside, he did not think any tribunal could be found who would venture to convict the Company of having been unfaithful in this respect to the trust which had been committed to them. There was one other matter to which he wished to refer. Remarks were from time to time made in the Corporation with reference to gas and gas lighting; and at the last meeting, Mr. Petrie, the Chairman of the Lighting Committee, said the only weapon with which the Council could get at the Gas Company was the electric light, and he thought that with the aid of Bootle they would be able to bring the price of electricity to nearly that of gas. Alderman Smith added that if the Company were allowed to produce water gas, he was afraid they would be able to defy the competition of the electric light for many a long day. He (the Chairman) thought that such remarks ought not to have been made by a man holding the position Mr. Petrie held. His statement simply amounted to this—that, unless the Company were prepared to accept the Corporation dictum as to how their business was to be carried on, the Corporation would do everything they could to injure the Company's property. That was the English of it. They could only get at the Company through the electric light; and they would try to cheapen that light so as to bring the price down to that of gas, and so, if possible, get rid of gas altogether. Well, he did not object in the slightest degree to fair competition. The Corporation had taken up the electric light, and the Gas Company were prepared to meet them in fair and open competition. But he did not think it was right that the Chairman of the Lighting Committee should publicly hold out a threat which was tantamount to saying that if the Company would not do just as the Corporation wished, they would do everything they could to injure the Company's interests. To be forewarned was to be forearmed; and if the Corporation told them that this was the principle upon which they were going to treat with them in the future, the Company would reply that they must look to themselves. He could safely say, on behalf of the Directors, that they would not neglect to do everything in their power to protect the shareholders' interests in these matters; and he might also say, as he had said before, that he had been one of those who had fully recognized that the gas consumers had an interest to be protected.

Mr. J. LISTER seconded the motion.

Alderman J. N. STOLTERFOHT congratulated the Directors on the increased consumption of gas, inasmuch as one of the largest Gas Companies in London reported a decrease of 2 per cent. in the second half of last year. With all due deference to the Chairman, and to the remarks he had made, he (the speaker) thought it would be well if some statement were put forward as to the exact quantity of water gas that was sent out, and also as to the districts in the city in which it was supplied.

The CHAIRMAN thought Mr. Stolterfoht was rather under a misapprehension about the exact nature of the Departmental Committee's report. If the Committee had come to any decision as to what should be the exact quantity of carbonic oxide that was to be allowed, it might have been in the Company's power to go into the matter. The Committee merely said that "power should be conferred upon a Central Department to make regulations, enforceable by adequate penalties, limiting the proportion of carbonic oxide in the public gas supply at night to 12 per cent., or such greater amount as the Department may consider desirable." Well, they did not know where they were. With regard to the question of the prevention of danger, the report said: "The most direct, and, in our opinion, the only effective method of preventing danger from water gas, is to fix a limit which the carbonic oxide in the public and domestic gas supply shall not, in ordinary circumstances, exceed. It is difficult to assign a limit applicable to all circumstances. In some cases, 12 per cent. of carbonic oxide in the gas supplied might be proper; in others, 16 or perhaps 20. The question depends on a number of circumstances which must vary in different localities." They would thus see the uncertainty that existed, even in the minds of those eminent gentlemen, as to what the minimum was to be. Putting aside the short period at the commencement when the Company sent out the water gas pure, if they were going to supply it in the same ratio as they had done in the past two years they would be within the limit, which was put down at 20 per cent. With regard to some of the water gas they were supplying now, it would be found to be below the lowest limit of 12 per cent.

The report was adopted.

The CHAIRMAN moved that a dividend be declared for the past half year of 5 per cent. on the ordinary consolidated stock, and of 3½ per cent. on the consolidated 7 per cent. stock created under the Company's Acts of 1865, 1882, and 1886.

Mr. LISTER seconded the motion; and it was agreed to.

A vote of thanks having been accorded to the Chairman for presiding, and to the Directors for their services during the half year,

The CHAIRMAN, in acknowledging the compliment, spoke of the great improvement which had taken place in the value of residuals. They had obtained a much higher price for coke and also for ammonia, which would have a significant bearing on the accounts at the end of the year.

CROYDON COMMERCIAL GAS AND COKE COMPANY.

The Half-Yearly Meeting of this Company was held last Wednesday, at the Offices, Katharine Street, Croydon—Mr. CHARLES HUSSEY in the chair.

The SECRETARY (Mr. W. J. Russell) having read the notice convening the meeting, the report and accounts, which were summarized in last week's issue, were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said their total capital expenditure to Dec. 31 last was £374,540, of which £3096 was spent in the half year. He did not think anyone could accuse the Board of having been extravagant during the six months; and the smallness of the amount was due to the fact that they had not had occasion to erect new buildings or plant in connection with the manufacturing part of their business. Of course, their requirements in this respect varied from time to time. Of the £3096, £888 had been spent in new mains, services, and other work connected with the distribution. New meters had cost them £1076; and he wished it to be clearly understood that this was for new meters, and not for meters which had been used to replace defective ones. On gas-stoves £513 had been spent; and on house fittings, £619. Referring next to the revenue account, he pointed out that on coal, oil, &c., £19,284 had been expended. During the half year, they had not carbonized anything like the same quantity of coal, because, as was well known, they had erected a carburetted water

t as plant. The quantity of coal carbonized was 8825 tons less than in he corresponding half of 1897; but, of course, on the other hand, they had had to spend more on oil for carburetting the water gas. Then the outlay on repairs and maintenance of the works amounted to £5409; and, adding the figures under the various other heads, brought up the total expenditure for the half year to £42,430. On the credit side of the account, it would be seen that they had received from the sale of gas in the Croydon district £33,949, in the Carshalton district £4060, and from public lighting, £6035—giving a total of £44,044. This compared with £43,513 in the corresponding period of 1897; and the difference arose from the increase of 0·93 per cent. in the quantity of gas consumed. The rental of meters, gas-stoves, and house fittings amounted to £2966, as against £2462 in the December half of 1897. This showed that the business was expanding; and, in face of this, they had to account for the very small increase they had obtained in the consumption of gas in the half year. To do so, they had not to look far. They all knew that they had had an exceptionally mild season; and a very bad one so far as gas makers were concerned. They had had an increase of 557 ordinary consumers in the Croydon district, which, added to the number of 8729 at Dec. 31, 1897, gave a total of 9286. The prepayment consumers, too, had increased during 1898 by 600; making the total 3697. The number of automatic meters in use in the Carshalton district had increased by 70; giving them a total of 278. These figures added together showed that the consumers on the books now totalled to 13,261, and that there had been an increase on the year of 1227. He thought this must be considered very satisfactory; and there was not the slightest doubt that, if they had had normal weather during the winter months, the Directors would have been able to show a very different state of things. In proof of this, he might say that during the past three weeks, when the weather had been a little colder, there had been, as the Engineer (Mr. J. W. Helps) had shown the Board, an increase of rather more than 10 per cent. in the consumption of gas. If, therefore, with this abnormal state of the weather, and with the electric light (which had spread itself out to a certain extent), they were able to show the profit they had done, it was clear that, with normal weather, they would have had even more gratifying results. He knew there were some shareholders who thought the Directors were spending capital too fast; but he could prove most conclusively that, although they had been expending capital, they had been able to pay their dividends without in any way dipping into the reserve fund. Therefore he failed to see why the Board should be charged (as they were at a previous meeting) with having spent capital extravagantly. He was perfectly sure that the Directors were quite as careful and zealous in guarding the capital as any of the shareholders could be. They never authorized the expenditure of money unless they could see that it would be profitable and to the interests of the Company. In a few words, he should like to show the increase they had made in their earnings and in the amount paid in dividend during the past few years. In 1890, they made a net profit of £27,357; and the amount paid away in dividend was £24,749, which gave them a handsome sum to carry forward. The amount of profit in 1894 was £28,529; and the sum required for dividend was £26,974. In 1898, a profit of £33,176 was made; and the dividend required £30,258, which also gave them a very respectable balance forward. Another thing was that on this occasion, they had made a new departure in paying the dividend without deducting the income-tax. The Directors had been considering this for some little time; but they had not been satisfied that they were in a position to do it before. Having had such a splendid half year (the balance-sheet was the most satisfactory one he had had the pleasure of presenting to the shareholders since he had been Chairman of the Company), they felt the time had now come when they could safely pay the dividends without deducting the income-tax, and they were convinced that the proposal would be favourably received by the shareholders. This, of course, was not done without some little sacrifice on the part of the balance carried forward. He now desired to say a few words with regard to the labour question. He had no doubt that, about September last, many of the shareholders saw in the newspapers that a strike of gas stokers was threatened in the London district. Now Mr. George Livesey, without very much persuasion on the part of the stokers employed by the Companies in which he was concerned, met the men, and afterwards gave them what he considered to be a fair increase in wages. The men had not had an increase for several years; and, of course, the gas industry being a profitable one, it was considered that they should be fairly paid. The Crystal Palace Gas Company, of which Mr. Livesey was Chairman, granted to their men an increase of 7½ per cent.; and Mr. Helps brought this to the notice of the Directors. What their Engineer felt was this—that, in view of this increase of wages, they would be having their men drifting to the Crystal Palace Company, or else finding their way to London. As they had a good steady set of fellows, who had stuck to the Company through good and evil report, the Directors took the "bull by the horns" and approached them, rather than wait for them to approach the Board, and gave to the stokers and labourers an increase of about 7½ per cent. He was pleased to say the men were very satisfied with this; and everything was going on at the works in a proper way. He had one other matter to refer to, and that was a short time ago they had (he might say) the misfortune to lose Mr. Helps's brother, who, for fourteen years, had been the Assistant Manager at the works. During that period, he had given the Directors and, he believed, their Engineer thorough satisfaction with regard to his work in connection with the Company. He was offered the managership of the Redhill Gas-Works, and he accepted it. With regret, the Directors received his resignation; and he (the Chairman) was pleased to say they were able to give him a testimonial which they hoped would be of service to him in his future career. The Directors had appointed in his place Mr. A. Caddick, who had previously been at the Bath Gas-Works; and he believed they would find in him a good and useful man. In conclusion, the Chairman said he thought anyone who perused the balance-sheet would say, with the figures shown therein and a reserve fund of nearly £47,000, that the shareholders had an investment in one of the safest and best to ncerns in the country.

The Deputy-Chairman (Mr. A. J. Lambert) seconded the motion.

Mr. Dalziel, who appeared aggrieved at some comments made by the Chairman at the last meeting on remarks made by him at the February meeting (in the course of which he advised the "closing of the capital account"), accused the Chairman of having misrepresented him; but, as Mr. Dalziel evidently does not appreciate the necessity of a continual increase in the capital to meet the requirements of a growing business, no useful end would be served by reporting the discussion which took place at this meeting on the subject.

The Chairman, in reply to questions, stated that the dividends of the Carshalton shareholders would be increased at the same time as those of the Croydon shareholders; but he could not at present say when that would be. Previous to the amalgamation, the Carshalton shareholders were receiving 8 per cent.; and the first half year succeeding the amalgamation, they received 9 per cent. At the same time, the price of gas was considerably reduced in Carshalton; and that was the secret of the large increase in consumption in that district. He also promised that, when next capital was required, a call should be made upon the Carshalton shareholders.

The resolution was unanimously agreed to.

On the motion of Mr. Samuel Spencer, seconded by Mr. Baynes, dividends were declared at the following rates per annum: 14 per cent. on the consolidated "A" stock, 11 per cent. on the "B" stock, and 9 per cent. on the "C" stock and Carshalton shares, all free of income-tax.

The retiring Directors (Mr. T. Rigby and Mr. Corbet Woodall) and Auditor (Mr. J. Jones) were re-elected.

Dr. Thompson, in moving a vote of thanks to the Chairman and his colleagues, remarked that, on this occasion, the Directors were giving them an increased dividend by paying the income-tax, and, in addition, they had increased the wages of their servants. One felt that when they were able to do these things under the disadvantages of a mild winter, the Directors must have worked hard. In his own case, his gas account for this winter was 25 per cent. less than usual; and when they saw one individual paying 25 per cent. less for his gas, what must have been the total amount of loss the Company had sustained by the fine weather?

Mr. Barratt seconded the motion, which was heartily agreed to.

The Chairman, in responding, observed that he attributed the very good results in a great measure to the carburetted water-gas plant.

Mr. Cash testified to the position the Company held as a well-managed concern in the gas world. They were exceptionally fortunate in having a Gas Engineer of such widely recognized ability as Mr. Helps.

The Chairman referred to the zealous attention which both Mr. Helps and Mr. Russell gave to their work, and in which they were loyally aided by, he believed, the whole of the staff. He moved that a hearty vote of thanks be passed to them for their services.

Mr. Rigby seconded the motion, which was carried unanimously.

Mr. Russell having responded,

Mr. Helps, in his reply, expressed his great appreciation of the manner in which his services had been spoken of. It was also pleasing when one's assistant left, especially when that assistant was one's own brother, to hear him spoken of in the way in which the Chairman had referred to him that day; and when he had an opportunity of telling his brother of this, he was sure it would add to the gratification which he felt at the kind way the Directors treated him at the time of his leaving.

This concluded the proceedings.

TOTTENHAM AND EDMONTON GAS COMPANY.

Prepayment Meters and Fittings as a Capital Charge.

The Half-Yearly Meeting of this Company was held last Saturday, at the Offices, Willoughby Lane, Tottenham—Sir Henry Cartwright, the Deputy-Chairman, in the absence of Mr. Corbet Woodall, presiding.

The Secretary (Mr. James Randall) read the notice convening the meeting; and the report and accounts, of which an epitome was published last week, were taken as read.

The Chairman, in moving the adoption of the report, expressed his regret that Mr. Corbet Woodall was unable to be present on this occasion. He had been to Egypt on professional business, and had hoped to arrive in London on the previous night, so that he might have been at the meeting; but unfortunately the inclement weather had delayed his return. Turning to the business, Sir Henry said he was happy to say they had another prosperous report to submit to the proprietors. On the last occasion, they had a good report; and the present one was equally progressive. The consumption of gas continued to increase. It seemed to him the population of London was gradually drifting towards the north—at any rate their district was growing very materially; and the Company were being constantly called upon for supplies of gas by new residents. This being the case, they made greater profits; but with increasing profits, there must be increasing expenses. During the half year, there had been an advance of £5064 in the receipts; and if there had been nothing extra to go against that, it would have been a very nice gain, but the expenditure showed an increase of £6164. The profit, however, was £10,328; and with the balance from the previous account, £1444, after deducting interest on debenture stock and deposits, they had an available sum of £10,663. With such a satisfactory advance in their income, the proprietors would naturally look for some explanation regarding the large increase in the expenditure. In the first place, they had had to pay 5½d. per ton more for coal. Then they had also been liable for additional expenses in connection with labour. The Directors had endeavoured to control their labour market as well as they could; but they did not try to unnecessarily screw down their employees. They wished to keep them in a state of contentment, and to do what was just. Wages were gradually rising throughout the country; and it was useless for one Company or firm to set themselves against this fact. Another cause of increased expenditure was the larger outlay in the half year upon new retorts. With the consumption of gas increasing they must have the means of producing more; and, therefore, they had had to extend and renew their retort-beds. It was hoped that one-half of the beds would be ready within the next two or three months; and before next winter they would have the other half intact. Of course, the construction of these retort-beds also meant a larger outlay for labour; and, indeed, it was impossible to limit their expenditure to any particular sum just now, in view of their growing business. There was no doubt, too, that, within a short period, the Directors would have to tell the proprietors that they must construct an entirely new retort-house. Then, again, rates and taxes were constantly moving up. The Directors had looked carefully into this matter, had met the authorities and discussed

it with them, and, in fact, had done all they could to protect the Company in this respect. During the half year, the rates and taxes had increased by £203. This was very annoying, because there seemed to be no finality about them. The Local Authorities said they could not do their duty without more money; and so the Company had to pay greater amounts in rates and taxes. The Directors, however, had taken care that the imposition of further taxes was not in excess of what could be legally demanded; and this was all they could do. There was another matter he should like to bring to the notice of the proprietors. It was a point of principle, and rather a serious item. When they established the furnishing of prepayment meters and fittings, the Directors put the whole of the outlay upon them to capital account. They could not foresee how great an increase there would be in this department. They looked upon it as likely to be a progressive matter; but nobody could foretell that the demand for prepayment meters would be so great as circumstances had shown it had been. When first the Company went into this business, they put the whole cost to capital; and the reason for doing so was, as put to them by their Engineer and others, that, as they kept the meters and fittings in constant repair, they could not say there would be any great depreciation upon them. But the Auditors had lately pointed out to the Board this fact: That, as the meters were fixed in very small houses, and were of cheap construction, there was a material depreciation in them, and that the deterioration ought not to affect capital account—that, if they charged the whole cost of these fittings to capital account, and the deterioration went on, they would be having in the capital account something that was not represented by assets. The Directors recognized this position, and what they had done was to take from capital account the cost of the prepayment fittings, and put it to a special account, which could, as time went on, be gradually reduced out of the earnings of the automatic-meter system. This put their accounts on a perfectly firm basis, which no professional accountant could find fault with. The Directors were much obliged to the Auditors for having brought the point before them. The matter was a little difficult to face at first; but they had dealt with it in, he believed, a satisfactory manner. It must be remembered that, in case of a collapse, these fittings would be of little value, because, as he had said, they were of cheap construction, and were fixed in small houses. They could not therefore depend upon securing their property; and they found the fittings were sometimes damaged, and sometimes even made away with. He proceeded to speak of the necessity of increasing the use of automatic meters, and of the benefits that had accrued to the Company from them. He also referred to the conversion of the Company's stocks—remarking that, by the change, the proprietors would not gain, but it would remove misapprehension as to the Company paying inordinate dividends. It had always been the policy of the Directors, in order to advance the welfare of the Company, not only to take into consideration the interests of the proprietors, but also those of the consumers. They had been anxious to guard against electricity and cheap oil superseding gas; and the Company had gained ground by their policy of reducing the charge for gas. He then alluded to the electric lighting proposals which the Company put forward some time since, but which, owing to the Local Authority thinking they could do the work themselves, were not proceeded with. If the Local Authority approached the Company again, or intimated their wish to reconsider the matter, the Directors would be willing to help them.

Mr. James Warren seconded the motion.

The Secretary, replying to a question, stated that the price of gas by ordinary meter was 3s. per 1000 cubic feet, and under the prepayment system 3s. 8d.

Two shareholders having spoken favourably of the stock conversion scheme, the motion was unanimously passed.

Mr. Henry Bailey proposed the declaration of dividends at the rates of 6 and 4½ per cent. per annum respectively on the "A" and "B" consolidated stocks. He mentioned that the dividends (which they had earned in the half year) worked out to exactly the same amount as was paid before the conversion of the stocks.

Mr. D. Ford Goddard, M.P., in seconding the proposition, remarked that it was the most satisfactory statement that could be made, that they had fairly earned their dividend in the half year; and they had done this without in any way sacrificing the undertaking. The works had been fully maintained in an efficient condition; and anybody who studied the accounts would see that the Directors had spent a large sum of money on replacing the old retorts by new ones out of current account.

The proposition having been agreed to,

Mr. E. H. Cartwright moved a vote of thanks to the Chairman and Directors and officers for their attention to the Company's business.

Mr. H. D. Ellis, in seconding, said he was thoroughly in accord with the recommendation of the Auditors, and its adoption by the Board, that the capital account should be spared the large outlay which it had been bearing in regard to automatic meters, and that it should be carried to a suspense account. They could not have done a better thing. They might also have done the same with regard to the parliamentary expenses, £659, and have paid them off out of the increased profits. But no doubt the Directors had considered the point, and saw some reason for not doing so. Mr. Goddard, in seconding the dividend, had referred to the amount spent on wear and tear, £6190. He (Mr. Ellis) was more pleased to see this than anything else in the accounts. Instead of showing an exaggerated balance, the Directors had done their utmost towards relieving the capital account, and had made good the works out of the handsome profits of the half year. Regarding the motion, the proprietors were grateful to the Directors for what they had done in the past; and they had the greatest confidence in what they would do in the future. There were matters of the utmost importance which would come in the immediate future before the directors of gas companies in every part of the kingdom; and he was sure they could trust to the discretion and judgment of their able Chairman (Mr. Woodall) and the Board to deal with them.

The motion having been heartily carried,

The Chairman responded, mentioning that their Engineer (Mr. W. H. H. Broadberry) had been laid up for a few days with an influenza cold; but it was believed that he would shortly be restored to his usual health.

The Board of Trade have confirmed an Order entitled the Barking and Beckton Light Railways Order, 1898, authorizing the construction of light railways between Barking Town and the Beckton Gas-Works.

NEWCASTLE AND GATESHEAD GAS COMPANY.

The Annual Meeting of this Company was held last Wednesday—Mr. W. B. Wilkinson in the chair.

The report of the Directors, noticed in the "Journal" a fortnight ago, having been presented,

The Chairman said the Company had had a very satisfactory year. Having paid for the first half of the year a dividend at the rate of 9¾ per cent. per annum, they found themselves able to pay at the rate of 9¼ per cent. per annum for the second; thus averaging 9½ per cent. for the year, carrying forward as undivided profit £3579, and having, in addition, the reserve fund of £5000. The prospect was good for the present year; and the Directors hoped to be able to show even better results in the report presented twelve months hence—satisfactory contracts having been made for the sale of coke, and the sulphate of ammonia market being favourable. It was with very great reluctance that the Directors increased the price of gas by 2d. per 1000 feet; but they felt compelled to do it. The rise did not, however, cover the extra cost of coals. The present price of 2s. was still a very low one, when the discount was taken off. The four towns having the cheapest gas in Great Britain were Widnes, Newcastle, Plymouth, and Sheffield—the average price per 1000 cubic feet paid in each of them during their last completed year being: Widnes, 1s. 7·5d.; Newcastle-on-Tyne, 1s. 8·6d.; Plymouth, 1s. 9·2d.; and Sheffield, 1s. 9·7d. They had used during the year 235,484 tons of coal, and made 2518¾ million feet of gas. They had a gross revenue of £265,783, £70,227 of which was profit on the year's working. On looking back fifteen years, to 1883, he found they then used 116,492 tons of coal, and earned £141,767; so they had in fifteen years just about doubled their make and revenue. The price of gas in the former year (1883) was 2s. 1d. per 1000 cubic feet; and in the latter (1898), 1s. 11d. In the present year, so far, the increase in the make of gas was abnormal; being far in excess of any previous year. They had laid during the year 28 miles of new mains, making a total of 463 miles; fixed 1749 new meters; and erected 249 new public lamps—making a total of 9773. The new retort-house at Redheugh was nearly completed. It had been erected on the best-known system, and would be fitted with West's mechanical stokers for charging and discharging the retorts. This house would be capable of making more than 3 million cubic feet of gas a day, or equal to an increase of about 27 per cent. in the gas-making power of both works. The total make at Redheugh would then be equal to 10 millions daily, in addition to which 5½ millions could be made at Elswick. In a few months, any further large outlay at Redheugh would cease. He concluded by moving that the report be adopted, and that a dividend at the rate of 5 per cent. per annum be paid upon the preference stock, and at the rate of 9¼ per cent. per annum upon the ordinary stock, for the half year ended Dec. 31, 1898.

Mr. L. W. Adamson seconded the motion; saying that the report was the best they had had for ten years. They had made more money and divided more than they had ever done before.

The retiring Directors having been re-elected, the salary of the Secretary (Mr. T. Waddom) was raised by £100 per annum, a resolution was passed authorizing the subscription of a sum not exceeding £5000 towards the undertaking of the Redheugh Bridge Company, and a vote of thanks was accorded to the Chairman.

The proceedings then terminated.

BROMLEY GAS CONSUMERS' COMPANY.

The Half-Yearly Meeting of this Company was held on Thursday, at the Royal Bell Hotel, Bromley—Mr. Alexander Dickson in the chair.

The Secretary (Mr. H. W. Amos) having read the notice convening the meeting, the report of the Directors, with the accounts for the six months ending Dec. 31, 1898, an abstract of which appeared in the "Journal" last week, was presented.

The Chairman, in moving the adoption of the report, said he thought they would conclude that the progress made during the past half year afforded every ground for contentment. If, on the one hand, the more rapid growth of the consumption of gas during the last two winters had been retarded, on the other the recovery in the prices of the residuals had given them a better margin of profit upon the business done. Notwithstanding the unprecedented weather, they had maintained as good a sale of gas in 1898 as in 1897, with an increase of 4 per cent. upon it; so that they might look ahead with confidence. During the past year, the total make of gas amounted to 230½ million cubic feet, of which 117 million cubic feet was made in the last half year—being an increase of 8¼ million cubic feet upon the previous year. Referring to the rise in the price of coal, this was chiefly due to the revival of trade in Liverpool, Manchester, Birmingham, and other large centres, which no doubt would tend to make the price of gas coal firm for some little time to come. On the revenue account, they showed a total additional income of £1453 as compared with the corresponding half of 1897; and though there were several increased items on the other side of the account, the net result of the working of the half year gave them an increase of £895. As to their prospects, everyone associated with Bromley would have noticed how rapidly it was rising as a residential resort; and the great demands were for houses ranging from £60 to £100 per year, which class of property generally brought a gas company very profitable customers. The Company must, therefore, be in a position to do larger business. During the past six years, the retort-houses had been entirely re-modelled and doubled in size; new coal elevators and carriers had been adopted; and hydraulic stoking machines had been used, with most excellent results. A new and commodious purifying-house, new coal-bunkers, a new engine-house and boilers, and larger mains had also, with many other improvements, been provided. All these works had been quietly effected without the slightest interruption in the supply; so that the Company were now prepared to meet with ease the increased demands for gas which had arisen in the interval, and which represented 67 million cubic feet increase in the consumption of last year over that of the year prior to the commencement of the extensions and improvements. The price of gas had never risen above 3s. per 1000 cubic feet during that time, and the same dividend had been maintained throughout; while the reserve fund had been increased by £1000, and the balance of undivided profit by £2000. One result of this

effort had been that during the past year there had not been a single complaint of the quality of the gas. As to the public lighting of Bromley, the Company had just entered into an arrangement with the Urban District Council for providing powerful incandescent burners in the principal thoroughfares. The Directors had during the past six years put the Company in as strong a position as possible; and in this way they had safeguarded the shareholders' property and prospects. By the improvements already referred to, they had provided for a daily maximum output of 2 million cubic feet; and as up to the present time no single day's make had gone beyond 1¼ million cubic feet, they would see that they had allowed a sufficient margin of manufacturing power to enable them to meet any emergency that was likely to arise in the district.

Mr. B. H. Latter seconded the motion, which was carried.

Upon the proposition of the Chairman, a resolution was passed authorizing the issue of 300 new shares of £10 each.

The retiring Directors (Messrs. A. Dickson, B. H. Latter, and H. S. Hughes) and the Auditor (Mr. A. S. Hicks) were re-appointed.

The Chairman, in proposing a vote of thanks to the Engineer, Secretary, and the Staff generally, spoke in eulogistic terms of the great skill and ability with which the Engineer (Mr. Woodward) had designed the whole of the improvements, and personally superintended the work.

Mr. W. Woodward, in returning thanks, said he believed the Company had been saved from £8000 to £10,000 by carrying the works out when they did. They would cost 15 or 20 per cent. more at the present time.

A vote of thanks to the Chairman and Directors brought the proceedings to a close.

BARNET DISTRICT GAS AND WATER COMPANY.

Mr. Alfred Lass's Retirement as Secretary and from Active Work.

The Half-Yearly Meeting of this Company was held last Friday, at the Albion Tavern, Aldersgate Street, E.C.—Mr. Charles Horsley, the Deputy Chairman, presiding.

The Secretary *pro tem.* (Mr. Ernest W. Drew) read the notice convening the meeting; and the report and accounts were taken as read.

The Chairman, in proposing the adoption of the report and accounts, said he was sorry to say that their Chairman (Mr. James Glaisher) had not been well for a considerable time; and therefore he was unable to occupy his usual position that day. He did not think that Mr. Glaisher had missed a meeting the whole time he had been Chairman; and having worked with him for something like 27 or 28 years, he (Mr. Horsley) deeply regretted the cause of his absence. His son (Dr. Glaisher), however, reported that he was better; and the Board trusted that he would soon regain his strength, and be able to return to his accustomed place. Proceeding to the operations of the half year, the Chairman said they had raised £15,168 on capital account; but they had spent on a new tank and gasholder and other requirements, £12,707. The gasholder and the new connections for it had cost them a total of £13,707, of which £1000 had been taken from the revenue account. The new holder had a capacity of 750,000 cubic feet. With respect to the gas revenue account, the consumption of gas for private lighting produced £7526, which was an increase of £320. For public lighting, they received £930, which was an advance of £51. Meter-rental was slightly higher. Coke had also gained by £317; but against this had to be set a loss of £73 on tar. Altogether, the receipts, amounting to £10,705, had improved by £635. Naturally with this increase in the profits, the expenditure had gone up. Coal had cost an additional £337, and wages £72. Rates and taxes had advanced from £396 to £433, which showed how largely the Company contributed to the rates and taxes of the district. The total expenditure was £6901, which was an increase of £524. Deducting this from the gain of £635 on the other side gave them a net increase of £110 over the corresponding half of 1897. The amount of gas made per ton of coal carbonized was 10,910 cubic feet, which spoke well for the attention their Engineer had bestowed upon the manufacturing operations. The unaccounted-for gas was 8·23 per cent. Sulphate of ammonia showed an average production of 1 ton per 100 tons of coal carbonized, which was also very good working. Concerning the water department, he said the rental had increased by £711, which was highly satisfactory; but, on the other side, the cost of maintenance of works had risen by £116. There was an increase of £2362 for pumping, which he wished to explain. It would be remembered that at Potters Bar they had been sinking a well and driving adits, from which they had had a very fair supply of water. During the drought of last summer, the Directors decided, instead of running short of water and having complaints, to utilize the temporary machinery at the well, and send water from it into the district. This they did, and so saved much trouble and worry. The increase of £2362 in expenditure, caused a decrease of £1977 in the profits. But although they had this decrease, they had £1000 which they had taken from revenue for works which had been pulled down, and this sum they had been carrying over for some time from year to year. The extra pumping had cost them £2500; and before the half year began they had spent £322. He considered this was a very judicious expenditure, because it maintained the supply while other companies were short of water. The profit on the gas undertaking was £3805, on the water £4683, and on fittings £73—together £8561. Interest on the bonds and income-tax required £1256; and they would have £7304 to meet the proposed dividends. They would therefore be £797 short of the amount needed; but they had a good available balance. He added that the yield of the East Barnet well had satisfied the Directors sufficiently to warrant them in ordering machinery for it, and to arrange for the pumping. They had not finished the work yet; but when they did, he hoped they would have sufficient water to serve the district for some time to come.

Mr. A. H. Baynes, in seconding the motion, referred with regret to the death of Mr. W. Joslin, who had served the Company with fidelity on the Board since 1872.

Mr. H. J. Robus congratulated the Board on the balance-sheet which had been presented. It was an excellent one, considering the mildness of the winter which had affected the consumption of gas, and the drought of the summer which had affected the water supply. The explanation of the Chairman as to the large increase in the expenditure on the latter was highly satisfactory. Some three or four months ago, he (Mr. Robus) visited both the gas and water works; and he must say that, on the completion of the extensions in progress at the gas-works, they would be unsurpassed in England. They were kept well up to date; and there were many economies in the works that he had not seen elsewhere.

The motion having been carried,

A dividend was declared at the rate of 9 per cent. per annum on the "A" and "C" stocks, 8 per cent. on the "B" stock, and £6 6s. per cent. on the "D" capital.

The retiring Directors (Mr. C. Horsley and Mr. I. A. Crookenden) were re-elected. Both gentlemen returned thanks; Mr. Crookenden remarking that he hoped the Company would never suffer as the East London Water Company did during the drought of last year. They might be sure that the only reflection he had in the matter was the old adage that "virtue is its own reward." His Company were in no way to blame; being, as they were, hard hit by the elements, over which they had no control. He sincerely trusted that the vagaries of the rain would not extend to the Barnet district.

The retiring Auditor (Mr. A. G. Hounsham) was also re-appointed.

The Chairman said they now came to an important part of the proceedings, and that was the retirement of their able Secretary, Mr. Alfred Lass. Mr. Lass had occupied that position for 27 years; and he had known him personally for between 35 and 40 years. Therefore he could speak well of Mr. Lass; and his work and reports spoke for themselves. The Directors were unanimously of opinion that the man who had served them so faithfully as Mr. Lass had done for over a quarter of a century should be rewarded. He (the Chairman) therefore had to propose—"That in consideration of the long and faithful services of Mr. Alfred Lass as Secretary and Accountant to the Company, an allowance of £250 per annum during his lifetime be given to him on his retirement." During the troublesome times through which the Company passed in the early years of its existence, Mr. Lass worked very hard indeed.

Mr. Robus, in seconding the proposition, spoke of the admirable manner in which the books and accounts of the Company had been kept by Mr. Lass. The allowance of £250 was the least recognition they could make of his work for the Company; and in obtaining his consent to take a seat on the Board, the Directors had made a grand acquisition.

The motion was passed with much enthusiasm.

Mr. Lass, who spoke with considerable feeling in acknowledgment, said: Mr. Chairman and gentlemen, will you allow me in the first place to say how sorry I am that our dear old friend Mr. James Glaisher is not here to-day, and to add a sincere hope that, in the course of a short time, he will regain his usual health and strength, and that his last days may be long and peaceful, happy and blessed. I have to acknowledge the great kindness I have received at the hands of our worthy Chairman, Mr. Glaisher—nothing but kindness from the time I first knew him to the present day. At the same time, I wish to acknowledge the kindness I have received at the hands of every member of the Board. Some of them have passed away to the great majority; others are still here. During the whole of the time I have been connected with this Company, I do not recollect one instance in which the Board and myself have had anything like a difference to talk about. I should also like to acknowledge the kindness shown to me by the officers and staff of the Company. We have been particularly blessed in the selection of our officers, all of whom have worked harmoniously and conjointly with the Board. During the whole time I have been connected with the Company, not one of the staff or myself have received anything but the greatest kindness and consideration from every Director; and I think it is only due I should recognize now the great benefits that have been derived by this, because if officers do not work harmoniously together, the interests of the Company suffer. In this case, the officers have worked harmoniously with the Board; and the result is seen to-day. I am pleased to look back over a period of 27 years, and to compare the position of the Company 25 years ago with the position to-day. I well remember the time when no dividend was paid; and although many shareholders might not have considered that was the best thing that could have occurred to the Company, yet, on looking back, I feel quite satisfied that the prosperity of the Company dates from that time. We found the Company could not be bolstered up and pay a dividend; and therefore the Directors, in their judgment, and in consultation with their officers, decided that the best course would be to let the thing down as low as it would go, and then commence *de novo*. From then to the present, the Directors and staff have been working and pulling together with one aim and one object, and that aim and object has been at all times the prosperity of the Company, and the payment of a fair dividend on the capital which has been invested in it. I set myself a problem 25 years ago; but I cannot say I have altogether reached the goal. I think, however, we have arrived at two-thirds of the way; and I shall be very pleased indeed when the prosperity and financial position of the Company is such that we shall have reached the goal. Perhaps the position in which I should like to see the Company is somewhat high; perhaps I have placed it at too high a standard. But, however high that standard may be, I think I am fully entitled to say to-day that we have at least got two-thirds of the way on to that high position. I should like also to acknowledge the kindness I have received all these years from the proprietors. Nothing but kindness; and I think it only right I should acknowledge it to-day. I feel very deeply in regard to the resolution which you have been kind enough to pass with reference to myself; and I thank you most sincerely for the confidence you have reposed in me in the past, and for the vote you have so unanimously given to-day. Now although I have resigned from the position of Secretary and Accountant to this Company, yet I can assure you that I have not lost my interest in it. I hope you will take that as being an absolute fact; and I think, as I have been elected a Director in the place of my old friend Mr. Joslin, that will be an incentive still further to work for the general prosperity of the Company. I can also assure you, gentlemen, that, as a Director, I shall endeavour to work harmoniously with every member of the Board and of the staff. My one aim and object will be to promote the prosperity of the concern in every conceivable way. When I tell you that, in consequence of ill-health—the breaking down of my nervous system—I feel quite incapable of carrying on business, that I have, under the doctor's advice, and at the solicitation of my friends, decided to retire from public life very nearly altogether, and I think from March 31 next I shall practically retire from the position which I hold in connection with my firm, you will see that I shall have a considerable amount of leisure on my hands; and it is my intention to devote as much of that

leisure time as I can to the furtherance of the general interest and the prosperity of this Company. I sincerely hope I may live some years to see the goal reached that I have placed before myself with reference to this Company. I believe that perhaps in another ten years we shall have arrived at that goal. I sincerely hope we may. If we do, the financial position of this Company will be second to none in the country. I thank you sincerely for your kindness to me throughout many years; and I assure you I shall do all I can to promote your interests.

The Chairman and Directors and officials were all heartily thanked for their services; and the proceedings terminated.

PROVINCIAL GAS AND WATER COMPANIES.

Gas Companies.

The annual meeting of the Barnsley Gas Company was held yesterday week, when, in the absence of the Chairman (Mr. E. G. Lancaster), the chair was taken by Mr. C. Lingard. To the Secretary and Manager (Mr. W. W. Hutchinson) fell the duty of comparing the balance-sheet with that of 1897. He showed that the cost of coal, &c., £6697, had increased by £441, and salaries, &c., by £188, owing to the extra quantity of gas manufactured. There was a decrease on the amount for repairs of £364; but rates and taxes had increased by £101. The profit for the year was £8190, as against £8631. There was an advance on the gas sold of 3½ million cubic feet, with an increase of £507 in the receipts. Owing however, to the additional discount of 2½ per cent., the amount received was £28 less than in the previous year. The residuals realized £27 less, owing chiefly to the reduced price of tar. The total receipts were £26,414, against £26,403. The reserve fund had been increased to £1877. The Chairman, in moving the adoption of the report and balance-sheet, mentioned that before the shareholders met next year, it was possible they would have the electric light installed in the town. The Directors were not afraid of it, but rather of increased taxation. They would only lose one customer, and that would be for public lighting, which was most unproductive, for the Corporation were supplied at the rate of 2s. 7d. per 1000 cubic feet. Mr. Cooper seconded the motion, which was adopted.

The accounts of the Bishop Auckland District Gas Company for the past year show the total receipts on revenue account to have been £9534, and expenditure £5695. The Directors' report states that there is an available balance for division of £2214, out of which the payment of a dividend at the rate of 10 per cent. per annum on the original shares, and 7 per cent. per annum on the additional capital is recommended; leaving £466 to be carried forward.

The report of the Cheltenham Gas Company for the past year has been issued. It states that the stocks have recently been consolidated into 5 per cent. stock, and the share capital of the Company now stands at £237,000. There is also a 4 per cent. loan capital of £37,000. The recent issue of £5000 by auction realized a surplus of nearly £1320. The Company have power to issue a further sum of £79,961. The report records a substantial increase in the consumption of gas, comparing the past with the previous year. The income amounted to £56,424, of which £38,294 was received from private consumers, £4313 from public lighting, £1881 for rent of meters and stoves, and £11,188 from the sale of residual products. The net profit on the year amounted to £14,285, from which the full statutory dividend will be paid. This will allow of nearly £1000 being placed to the reserve fund, which will then reach upwards of £17,000. The total quantity of coal carbonized, under Mr. R. O. Paterson's supervision, was 34,270 tons of common and 65 tons of cannel, as compared with 33,039 and 115 tons in the previous year. The slot meter system has extended; 1624 customers having taken advantage of it.

The last half-yearly report of the Cleethorpes Gas Company shows that although there has been an increased expenditure on coals, repairs, works, and mains, the profit, which is £2168, is £162 in excess of the corresponding period of the previous year. After making deductions for income-tax, interest on mortgage loan, and bank charges, there is a balance of £1974 available for distribution, which is sufficient to pay the standard dividend of 10 per cent. on the old and 7 per cent. on the new shares (amounting to £1229), transfer £500 to the reserve fund, and carry forward a balance of £245 to the next account; while the gross revenue has been augmented by £644. The increase in gas consumption as compared with the second half of 1897 is upwards of 3 million cubic feet, or 13 per cent.

The accounts presented at the meeting of the Cork Gas Consumers Company last Wednesday showed an increase in the gas-rental for the six months ending Dec. 31, 1898, as compared with the corresponding period of 1897. This was partly owing, according to the report, to the extremely dark weather which prevailed during the latter part of the year. Other sources of the increase were the extended use of gas for cooking and heating, as well as for working gas-engines. Gas for these purposes is advancing in popular favour, as its great advantages and its economy are becoming more known. The receipts for residuals had slightly improved. The cost of coals was greater, in consequence of the general advance in prices and the higher rates of freight which had to be paid towards the end of the year. The balance on the profit and loss account was £5451; and to pay the usual dividend required £201 to be taken from the reserve fund. The Resident Engineer (Mr. T. P. Travers) reported that the plant and buildings had been maintained in good working order.

The half-yearly ordinary general meeting of the Farnworth and Kearsley Gas Company was held at the Company's works last Thursday—Mr. J. W. Watkinson presiding. The report showed a profit of £3494 on the revenue account, and the amount available for distribution was £5572. In moving the adoption of the report and statement of accounts, the Chairman referred to the continued prosperity of the Company and its sound financial position. The report was adopted, and the maximum dividends were declared. Seeing that the last reduction in price produced such a largely increased sale of gas, it was decided to still further lower it by 2d. per 1000 cubic feet from the 1st ult.

At the half-yearly meeting of the Harrogate Gas Company to-day, the Directors will express their satisfaction at being able to report that, notwithstanding the abnormally mild weather of the winter seasons of 1898, and the active competition of the electric light, the increase in the consumption of gas last year was 9¼ per cent. over that of 1897, and beats all previous records of annual increase. During the year, penny-in-the-slot meters were successfully introduced; and it is anticipated that this will lead to important developments of the Company's business. Having regard to the enhanced cost of coal, and the depreciated values of residuals, coupled with very heavy, but unavoidable, expenditure on repairs of works and plant and renewals of mains, the Directors regard the financial result of the year's operations as highly satisfactory, and worthy of special comment. The revenue amounted to £34,480; and the expenditure, to £23,478—leaving a balance of £11,002. There is a balance of net profit of £7444; and the Directors recommend the payment of dividends at the same rates as for the corresponding period of last year. Under the supervision of the Secretary and General Manager (Mr. H. Wilkinson), 20,400 tons of coal and 36 tons of cannel were carbonized last year; resulting in the production of 202,365,200 cubic feet of gas, of which 193,895,400 cubic feet were sold, 3,601,700 cubic feet were used on the works, &c., and 4,904,100 cubic feet were not accounted for.

At the half-yearly meeting of the Hastings and St. Leonards Gas Company next Thursday, the Directors will report an increased sale of gas during the six months ending Dec. 31, 1898; but the mildness of the weather made the increase less than was anticipated. The demand for prepayment meters and stoves continues. In conjunction with the Corporation of Hastings, an installation of incandescent gas-lamps for street lighting has been completed in the Hollington district, and has given much satisfaction. The accounts accompanying the report show receipts for gas amounting to £29,815; meter and stove rental producing £1930; and residuals, £6649—the total revenue being £38,649. The expenditure on the manufacture of gas was £21,872 (coal, oil, &c., costing £14,124, and the coal duty paid to the Corporation being £1867); distribution cost £1833; management, £1244; and the total expenditure was £27,159—leaving £11,489 to go to the profit and loss account. It is proposed to pay the usual statutory dividends. The working statements show that, under the supervision of Mr. Chas. E. Botley, the Company's Engineer and Manager, 15,641 tons of coal, 49 tons of cannel, and 110,897 gallons of oil were used in the manufacture of gas, of which 197,865,000 cubic feet were made (including 38,192,000 cubic feet of oil gas); 192,546,400 cubic feet being sold, and 194,525,000 cubic feet accounted for. The estimated quantities of residuals produced were: Coke, 9770½ tons; breeze, 627½ tons; tar, 146,708 gallons; and ammoniacal liquor, 295,119 gallons. Reference is made in the report to the death of the Secretary, Mr. W. Blackman Young, and to the appointment of his son, Mr. A. E. Young, who had acted with his father, as his successor.

At the annual meeting of the Ipswich Gas Company on the 20th inst., the Chairman (Mr. G. A. Biddell) delivered an interesting address in moving the adoption of the report, noticed in the "JOURNAL" last week. He said the substantial and steady progress of the Company could not be better illustrated than by comparing the capital employed per ton of coal used. This was now £5 9s. (being 7s. 4d. less than in 1897), as compared with £7 17s. 6d. twelve years ago. The full dividends had been earned; and, after paying these and all other interest and fixed charges, they were enabled to carry forward £5233—being £702 more than in the previous year. Passing on to give details of the Company's business, the Chairman said they had carbonized close upon 26,000 tons of coal; being 1645 tons more than in 1897. The gas made had been nearly 270 million cubic feet—an increase of 6 per cent. over 1897; that sold, nearly 253 millions, or an increase of over 14 millions. Nineteen years ago they sold less than half this quantity (at 3s. 6d. per 1000 cubic feet); the sale being then 8480 cubic feet per ton of coal used, against the present rate of 9730 cubic feet. The gas unaccounted for last year was rather over 5½ per cent. of the make; whereas nineteen years ago it was 12½ per cent. Turning to the revenue account, the total expenditure amounted to £36,595, against £34,129 in 1897; the total receipts being £47,673, against £44,619. From private consumers £31,543 was received, of which £6591 was from slot-meters (against £6059 in 1897), consisting of 1,581,840 pennies, weighing nearly 15 tons. There were 3404 of these meters fitted—an increase of 496—and still about 150 on order, as the Company were quite unable to keep up to the requirements. There were 88 gas-engines fixed—five more than in 1897—and others erecting. Residuals had produced £10,438—an increase of £950 over 1897. Of this sum, coke and breeze figured for £8314, or £708 more than before. Tar showed badly—viz., only £896. Sulphate of ammonia produced £1227; being £305 better than in 1897. The Chairman then dealt with the relative prices of coal and coke, and expressed surprise that users of Welsh coal in London and other towns did not have their boiler furnaces adapted to burn coke, which would, he said, effect a great saving in cost, and entirely prevent the smoke nuisance. Turning to the subject of corporation speculation, he supposed the Ipswich authorities would shortly introduce an installation of electricity; and probably at some future time work the trams by it. As a ratepayer, a manufacturer, and a consumer of gas, he objected to the Corporation speculating with the ratepayers' money in this way. It must, for some years at least, increase the rates, and in a measure impede the reduction in the price of gas. As a Gas Company, they would probably feel a temporary check to the rapid increase in the sale of gas; but that it would permanently check their onward progress he did not believe. He had yet to be convinced that the gas-engine was not the best motor for tramcars. If they waited a bit, he thought they would see them so improved that they would, for this kind of traction, oust all other motors where gas was cheap. The Chairman next offered a few interesting remarks on the national supply of coal, 202 million tons of which were raised in 1897—12½ million tons being used by gas companies; and he concluded by making a curious calculation as to what such a bulk of coal as that first named really meant. The address was listened to with much interest; and it was loudly applauded at its close. Mr. D. Ford Goddard, M.P., seconded the motion; and it was carried unanimously. Dividends at the rates of 12, 9½, and 9 per cent. per annum were then declared on the three classes of stock. The Chairman proposed a vote of thanks to the Secretary and Engineer (Mr. J. T. Jolliffe) and the staff, and spoke of him as a most able and hard working head of a body of employees who were all good men and true. The motion was carried by acclamation. Mr. Jolliffe, in response, said it added very much to the pleasure of discharging their duties to know that their services were so fully and generously appreciated by the Directors and shareholders. A cordial vote of thanks having been passed to the Chairman, the shareholders adjourned to the show-room, to participate

in that practical demonstration of cookery by means of gas which has so agreeably marked the conclusion of these meetings in recent years.

The half-yearly meeting of the Mirfield Gas Company took place last Thursday—Mr. John Tweedale in the chair. The profits for the half year amounted to £2349; making the sum available for distribution £3464. The Directors recommended a dividend of 10 per cent. on the old and 7 per cent. on the new shares; carrying forward £1139. The report was adopted, and the recommendations were agreed to. It was resolved to issue 500 £10 shares (7 per cent.), to raise money to carry out certain alterations and extensions of the Company's property.

The half-yearly general meeting of the Normanton Gas Company was held on Saturday, the 18th inst.—Mr. Edwin Mitchell, J.P., in the chair. The accounts for the half year ended Dec. 31, 1898, were approved. They showed a profit of £1136; making the fund available for distribution, after providing interest on mortgages, £3035. A dividend at the rate of 10 per cent. per annum for the half year was declared; leaving £2035 to be carried forward. The Directors were empowered to issue £5000 of new stock. The consumption of gas during the past year showed a considerable increase, to meet which arrangements have been made for an installation of regenerator retort-settings. The works and plant are in an efficient state.

At the annual meeting of the Northwich Gas Company last Wednesday, it was decided to declare a dividend of 4½ per cent. for the past half year on the ordinary shares, making 8½ per cent. for the year. The balance-sheet showed a falling off of £300 in the receipts, due to the reduction in the price of gas. At an extraordinary meeting subsequently, the shareholders considered letters asking if the Company were prepared to sell their undertaking to the Urban District Council. The matter was left with the Directors.

At the recent half-yearly meeting of the Peterborough Gas Company, the Chairman (Mr. W. Harris) stated that when the present Company took over the works the leakage was 23 per cent.; but this had been reduced to 7 per cent., and they hoped to get it down to 5 per cent., when they would stand as favourably as any other gas company in the kingdom. The increased consumption of gas had necessitated a further outlay of capital for the extension of the mains, and it had been decided to raise the remaining share capital. The sale of gas during the past year showed an increase of 4 per cent., which was thought an excessive amount, considering the mild season. Maximum dividends were declared.

The shareholders of the Portsea Island Gas Company assembled in goodly numbers at the half-yearly meeting on the 18th inst. The Clerk (Mr. C. Jenkins) presented the Directors' report, which set forth that the last six months had been among the most successful in the history of the Company. The number of cubic feet of gas sold in that period had been 363,673,100—an increase of 24,124,100 cubic feet on the corresponding period of 1897. The total income was £57,561, against £53,764; while the expenditure was £44,298, against £41,967. Dividends at the rates of 13, 12, and 5 per cent. per annum on the various stocks were recommended. After payment of these, there would be a balance of £20,517 to be carried forward. Reference was made to the appointment of Mr. J. D. Ashworth as Engineer, and Mr. H. Buckley as Assistant-Engineer of the Company. The proportion of gas unaccounted for had been large; amounting to no less than 34,827,200 cubic feet; and the Company's employees were making strenuous efforts to locate and stop the leakages. The introduction of penny-in-the-slot meters in Portsmouth had been highly successful; and the Company contemplated extending the system. The Chairman (Sir John Baker), in moving the adoption of the report, remarked that it was highly satisfactory that, notwithstanding the keen competition to which the Company were now subject, from both electricity and oil, the undertaking was as flourishing as it had been at any point of its previous history. The best feeling existed between themselves as a Company and the men employed by them; and they trusted this would ever continue. It was their duty to do their utmost to stop all waste and leakage; and with this object they were now having an extensive examination of the chief mains where escapes were suspected—their endeavour being to as nearly as possible adjust the quantity of gas manufactured to that shown to have been consumed. The Vice-Chairman (Alderman Sir W. D. King) seconded the motion; and it was carried unanimously.

At the half-yearly meeting of the Reading Gas Company last Tuesday, the Directors reported continued growth in the business, as shown by the increase in the quantity of gas sold in the six months ending Dec. 31, 1898, as compared with the corresponding period of 1897. In the past half year, the private consumption of gas amounted to 158,224,400 cubic feet inside the borough, and 5,347,500 cubic feet outside; the estimated quantity burnt in the public lamps being 10,656,364 cubic feet. In the corresponding period of 1897, the figures were 152,740,400, 4,901,600, and 10,383,693 cubic feet respectively. The revenue amounted to £30,941; the expenditure, to £25,876—leaving a balance of £5065. The sum available for distribution was £17,760; and the Directors recommended the payment of the full statutory dividends on all classes of stocks and shares. Under the supervision of Mr. E. Baker, the Company's Engineer, 16,394 tons 7 cwt. of mixed gas coal were carbonized in the past half-year; the following residuals being produced: Coke, 16,394 chaldrons; breeze, 76 loads; tar, 168,957 gallons; and sulphate of ammonia, 180 tons.

In the report submitted to the shareholders of the Redhill Gas Company at the ordinary general meeting on the 16th inst., the Directors stated that the buildings and plant were in fair working order. The accounts showed a balance of £4843 available for distribution, out of which the Directors recommended a dividend at the rate of 9½ per cent. per annum, less income-tax. An interim dividend of 4½ per cent. was paid in September last; leaving 5 per cent. to be paid on the 1st prox. The Directors explained that the dividend would have been at the rate of 10 per cent. had it not been for the heavy parliamentary expenses caused by the opposition of the Corporation to their Bill, which had to be withdrawn. The Corporation, having intimated their intention to apply to Parliament for a Bill to enable them to purchase the undertakings of both the Gas Companies, gave the Parliamentary Agents notice of procedure, despite the fact that the consent of the burgesses had not been formally given to charge the expenses on the rates. On a poll of the burgesses being taken, it showed that only 1392 were in favour of the purchase, whereas 3542 were against it. The Directors announced that the price of gas had been reduced 2d. per 1000 cubic feet from the 1st inst.; and should the Company be allowed to go on without being further harassed by the Corporation, another reduction might soon be looked for.

The accounts presented at the half-yearly meeting of the Riddings District Gas Company last Friday showed a balance of £2060 on the profit and loss account. The revenue in the six months ending Dec. 31, 1898, was £2061; the expenditure, £1265—leaving a balance of £796. A dividend for the half year at the rate of 5 per cent. per annum was declared.

At the recent half-yearly meeting of the Salisbury Gas Company, the Chairman (Mr. G. Fullford), in moving the adoption of the report and the payment of the usual dividends, ranging from 5 to 10 per cent. per annum, remarked upon the satisfactory character of the past year's working. He said the sales of gas and residual products had been well maintained, and, in fact, had increased all along the line. Sulphate of ammonia showed signs of a steady recovery from the low prices which had prevailed for some time. The new retort-house had been in operation during the winter, and had proved successful in every way. There was a considerable outlay for new mains, meters, stoves, and outside lamps; but these were good sources of revenue. The reason which enabled the Company to undertake the street lighting at a reduction of some 40 per cent. on the previous cost was the large saving of gas secured by introducing the new Welsbach burner, which was only brought out last June; and Salisbury was almost the first city to adopt it. The economy of gas was very great—more than 50 per cent. Any gas consumer could secure a similar economy by adopting the new burner; and many had already done so. Mr. W. Young seconded the motion; and it was carried unanimously. A hearty vote of thanks having been accorded to the Chairman, Directors, and officers of the Company for their services during the half year, Mr. A. R. Atkins (a Director) acknowledged the compliment. In doing so, he remarked that the Directors had all appreciated the need for moving with the times, and had endeavoured—he ventured to hope not unsuccessfully—to do so, although much outlay of time and of money had been necessary. Many of the new improvements in connection with gas-burners were yet only in their infancy; and there was room for a largely increased use of gas for heating purposes. They were fortunate in having in their Manager (Mr. Norton H. Humphrys) one who was heart and soul devoted to the interests of the Company, and also thoroughly in touch with the latest developments of modern science; and he would not allow any useful discovery to pass unnoticed. The Chairman said that great credit was due to their able Secretary (Mr. Whitehead), Mr. Humphrys, and the staff generally for the way in which the several departments of their business were conducted, which merited the entire approval and confidence of the Directors. Mr. Humphrys said that, speaking for himself and also for the staff, he could say that these commendations were highly appreciated. The past six months had been an active and an anxious time. An entirely new system of street lighting, involving changes in every detail, had been put into operation, and the new town office had been established. The demand for gas was never in a more healthy or vigorous condition than at present. New customers were being taken on every week; and he was continually receiving applications from parties who were desirous of using gas for one purpose or another.

The principal features in the report presented to the shareholders of the Scarborough Gas Company, at their half-yearly meeting on the 18th inst., were noticed in the "JOURNAL" last week; but a few particulars as to the Company's operations may be supplemented from the address of the Chairman (Mr. B. Fowler, J.P.) in moving its adoption. He stated that the Company had sold 7,224,691 cubic feet, or nearly 5½ per cent., more gas in the six months ending Dec. 31, 1898, than in the corresponding period of 1897, though the season had been a very mild one. They had realized by the sale in excess of the corresponding half year £945; in the rental of stoves and meters, £89; in the sale of coke, £565; and in the sale of liquor, £161. But there had been a decrease in the tar of £49, and in the ashes of £32 5s. 7d. The gross receipts were £24,104, as compared with £22,448—an increase of £1656. The payments were £15,793, as compared with £15,476—an increase of £317. The balance carried to the profit and loss account was £8310, as compared with £6971—an increase of £1339. This result was very satisfactory, and reflected great credit on the Manager (Mr. J. Holliday) and his staff. On the 31st of December, there were 6531 consumers on the books—an increase of 440, or 7¼ per cent., during the year. Of these, 194 were on the prepayment system. With regard to cooking-stoves on hire, they had increased during the year from 1238 to 1362. This, roughly speaking, was one to every four of the ordinary consumers. There were also 88 gas-engines in use, varying in size from ½ to 25 horse power. Of this number, 9 were used for private electric lighting installations, 42 for wood-sawing, meat-chopping, and corn-grinding, 14 in printing establishments, and the balance for coffee-grinding, bread-making, and other industries.

Water Companies.

The revenue account of the Clevedon Water Company for the past year, which came before the shareholders on the 16th inst., showed a profit of £1253; and the Directors recommended a dividend of 6½ per cent.—leaving a balance of £149. In their report it was stated that the consumption of water had at length so nearly approached the possible supply from the well, that the Directors had consulted Professor Boyd Dawkins, who advised the sinking of a well about a mile outside the town. This would involve a considerable outlay; and as soon as the Directors could obtain an estimate of the work, they would inform the shareholders how they proposed to meet it. The report was adopted.

For the first time in their history, the Exmouth Water Company made in the past half year sufficient profit to pay the maximum dividends. In spite of the excessive drought of last summer, they were able to maintain an efficient supply; and there is a steadily increasing revenue. The Chairman (the Rev. C. R. Carr) congratulated the shareholders upon these facts at the half-yearly meeting last Tuesday, and stated that, including the 10 per cent., 7 per cent., and 5 per cent. now to be paid, the dividends for the year upon the three classes of shares were £9 5s., £6 9s. 6d., and £4 12s. 6d. per cent. This was very satisfactory, considering that for the first fifteen years the Company paid no dividend at all. The Directors invited the opinion of the shareholders upon an offer made by the District Council to purchase the undertaking at a price to be settled by arbitration. The matter was discussed at length, with the result that the following resolution was unanimously adopted: "That this meeting, having considered the proposal of the Exmouth Urban District Council to purchase the undertaking of the Company, have no wish to dispose of the same, as they are quite satisfied with the security

it affords for their capital; but that if the District Council really desire to purchase the works at a fair and reasonable price, having regard to the sacrifices made by the original shareholders, the Company will consider any offer made by the Council."

At the annual meeting of the Faversham Water Company last Tuesday, a dividend of 9 per cent. on the original capital, and £6 6s. per cent. on the additional capital (£4479) raised in 1898, was declared. In the year a profit of £1425 was made. The Company will shortly issue more capital to meet the cost of proposed new works; the total raised at present being £16,479. They are about to construct a reservoir to hold upwards of 520,000 gallons, and also to deepen the well. Last year, when one of the headings was extended, the quantity raised was 80 million gallons.

The half-yearly general meeting of the South Staffordshire Water Company was held in Birmingham last Thursday—Mr. Frank James in the chair. In moving the adoption of the report, noticed in the "JOURNAL" on the 14th inst., the Chairman said the accounts showed an increased expenditure of £580 on engine charges. They had during the half year ending Dec. 31 last pumped 66 million gallons of water more than in the previous six months, and there had been a considerable amount of re-pumping. Apart from that, there had been an extra 712 tons of coal purchased; and the cost had been slightly increased owing to the fact that 1d. per ton had been put on to meet the liabilities imposed by the Workmen's Compensation Act. The expectation that the cost would be borne by the consumer rather than by the coalowner was being justified. The water-rents amounted to £51,095, against £47,951; and the result was that they had been able to pay to the depreciation fund £2000 instead of £1000, and carry down a balance of £24,097, against £21,617. The sum to the good, after payment of dividends, would be £6243, instead of £5045. They had laid during the year nearly 10 miles of mains. Having regard to these extensions, he thought they might assume that they had reached the period when it was felt that nearly every house in their area must be supplied with their water. They knew, too, that there was an ever-increasing quantity of water required per head, owing to the work of the Urban Sanitary Authorities. The report, in addition, covered a period of great anxiety, owing to the drought. The deficiency in rainfall last year was about 7 inches, and for the last 21 months it was 13¼ inches. It was therefore absolutely necessary that they should be alive to the demands which might be made upon them. He did not, however, think there was any immediate prospect of the supply requiring to be extended; but they had undertaken works at Shenstone, Aldridge, and Kingswinford, which they believed would increase the supply of water. When, however, they regarded the growth of population, it might be that when their reservoirs were fully developed they would have to adopt some portion of the Birmingham Welsh supply. So far as the capital was concerned, they had parliamentary authority still unexecuted to raise another £86,800, which, with premiums, would probably bring in about £140,000. Mr. Lloyd seconded the motion, and it was adopted. On the proposition of the Chairman, the dividend recommended was declared.

The annual general meeting of the Todmorden Water Company was held in Manchester on the 16th inst.—Mr. J. S. Littlewood presiding. The report and statement of accounts (noticed in the "JOURNAL" a fortnight ago) were received and adopted. No questions were asked on the accounts; the explanation given in the report being deemed satisfactory. The Directors were instructed, when the liquidation is complete, to distribute the balance available for division as recommended in the report, or such smaller amounts as may be available after the discharge of any further liabilities which may occur and of which the Directors are at present unaware. At the close of the meeting, engrossed testimonials were presented to the Chairman, the Manager (Mr. Radcliffe), and the Solicitor (Mr. Craven), in acknowledgment of the valuable services rendered by them to the Company, especially during the time when the undertaking was being transferred to the Rochdale Corporation. A special meeting was afterwards held, at which a resolution was passed to wind up the concern voluntarily; and Liquidators were appointed. A second meeting to confirm this was fixed to take place on the 14th prox., after which the liquidation will immediately be taken in hand.

The half-yearly general meeting of the West Surrey Water Company was held at the Offices, No. 38, Parliament Street, S.W., last Tuesday—Mr. A. T. Simpson presiding. The report of the Directors stated that the income for the six months ending Dec. 31, 1898, after making provision for empty houses, irrecoverable rates, &c., amounted to £4480, and the expenditure to £1717. Comparing the accounts with those for the corresponding half of 1897, the income exhibited an increase of £268, and the expenditure a rise of £228. About 1710 yards of 3-inch cast-iron pipes were laid, and 160 new supplies connected; representing a future rental of £305 13s. 7d. per annum. The Engineer and Manager (Mr. J. K. Hill) reported that the whole of the Company's works and plant were in good order. After transferring £300 from revenue to the contingency fund, the amount available for dividend was £2990, which the Directors recommended should be applied as follows: To the payment of dividend at the rates of 5 and 6 per cent. per annum upon the preference shares, amounting to £536; and at the rate of 6 per cent. per annum upon the ordinary shares, amounting to £1396—leaving a balance of £1058 to be carried forward. The report was adopted. The retiring Directors (Mr. A. T. Simpson and Mr. C. P. Simpson) were re-elected; and Mr. W. Liddall was re-appointed one of the Auditors.

At the meeting of the Woking Water and Gas Company to-day, the accounts to be presented will show a total capital outlay of £98,895, an expenditure of £3816, and a revenue of £7708. The balance carried to the profit and loss account is £3892; and the balance available for distribution is £1999. A dividend at the rate of 4 per cent. per annum for the past half year, free of income-tax, will absorb £1565; leaving £434 to be carried forward. The expenses for the year 1898 were abnormally heavy owing to the exceptional drought necessitating increased hours of pumping during the last six months, and causing a large additional expenditure for coal, labour, maintenance, and distribution. The Company have during the past year carried on the works with their own staff; and from the results obtained in the first six months the Directors have every reason to believe that a substantial saving would have resulted except for the unforeseen circumstances above mentioned. The Engineers (Messrs. Joseph Quick and Son) report that the engines, boilers, works, and mains are all in good order.

THE CAMBERWELL VESTRY AND INCANDESCENT GAS LIGHTING.

The South Metropolitan Gas Company's Offer Accepted.

At the Meeting of the Camberwell Vestry last Wednesday, Colonel Vincent, the Chairman of the General Purposes Committee, reported that several letters had been received from the South Metropolitan Gas Company with respect to the application of the incandescent gas system to the public lighting of the parish. The matter was opened up on the 3rd of December last by Mr. Frank Bush, the Company's Secretary, writing to the Vestry, and offering, on behalf of the Directors, to apply the incandescent system to the whole of the street-lamps and make use of the saving resulting from the reduced consumption of gas in improving the lanterns. (See "JOURNAL" for Dec. 27, 1898, p. 1479.) Two days later, Mr. George Livesey, the Chairman of the Company, and Mr. Bush met the General Purposes Sub-Committee on Public Lighting; and as a result of that interview a written undertaking was given that, in the improbable event of an increase in the price of gas within the next five years, no increase would be made in the proposed annual charge for the improved lamps and burners. The Directors also anticipated an expected reduction of 2d. per 1000 cubic feet, and fixed the following as their amended charges per annum for the various kinds of lamps: No. 2, £2 10s.; No. 3, £2 18s.; No. 4, £3 6s. After full inquiry and careful consideration, the Committee recommended—(*a*) "That the offer of the Gas Company be accepted upon the following additional conditions: That the change is completed in about a year, and that whenever the illuminating power of any of the several burners falls one-third below the standard for incandescent burners set out in the letter of the Company of Dec. 3—viz., 40 candles for No. 2 and 80 candles for No. 4—the Company shall replace the old mantles with new ones. (*b*) That it be referred to the General Purposes Committee to determine the order in which the streets are to be lighted by the new process, and what burners are to be used."

Colonel VINCENT moved the adoption of the recommendation.

A long discussion followed, and the following amendment was submitted: "That the report be referred back to the Committee with an instruction to consider the advisability of obtaining tenders for altering the existing street-lamps to the incandescent system; and further that the Gas Company be asked to tender for supplying the gas, for lighting and extinguishing same, and for repairing and maintaining the altered lamps and burners in such a state of efficiency that the illuminating power shall not fall more than one-third below that quoted by the Company.

Colonel VINCENT stated the Company had prepared an admirable analysis, which showed at a glance the Vestry's gain or loss per lamp per annum by the substitution of complete lanterns and incandescent burners in place of those now existing. It was as follows:—

Description of Burner and Lantern.	Gas Company's Proposed Yearly Charge.	Vestry's Gain.	Annual Loss.	Cost of Lantern Complete, with Burner.	Time Required to repay Amount Advanced by Gas Company.
No. 2. . .	£2 10 0 ..	13s. 9d. ..	— ..	£1 13 6 ..	28 months
No. 3. . .	2 18 0 ..	5s. 9d. ..	— ..	2 0 0 ..	83 ,,
No. 4 (Paris)	3 6 0 ..	— ..	2s. 3d.	2 10 0 ..	Never.

The yearly charge for the maintenance of the 5 feet ordinary lantern is £3 3s. 9d.

After some remarks, the amendment was defeated by 42 votes to 30; and the motion was then agreed to.

THE LONDON COUNTY COUNCIL AND GAS AND WATER SUPPLY.

The Proposed Gas Inquiry—The Charge for Repairs to Water-Mains.

At the Meeting of the London County Council last Tuesday, Mr. Cohen, M.P., called attention to the fact that he had been unable on the previous night in the House of Commons to move for the re-appointment of the Select Committee on the subject of the prices charged by the London Gas Companies, in consequence of the motion having been opposed by Mr. Pickersgill, whose action had the effect of blocking it. The opposition was based on the ostensible reason that the reference was too narrow. He was surprised at the action of Mr. Pickersgill, who had not given him any previous notice of opposition, and who knew that the reference was as wide as it could be made. It was in the precise terms accepted last year, when the Committee was appointed without a word of remonstrance from Mr. Pickersgill. At any rate, the result of his action would be to stop an inquiry upon which the Council and its officers had already spent a great deal of labour; and it was only right that the ratepayers should know that so long as his "block" remained on the paper the inquiry could not proceed.

The Water Committee presented a report on the subject of a dispute which had taken place between the Official Auditor under the Metropolis Water Act, 1871 (Mr. Allen Stoneham) and the Southwark and Vauxhall Water Company, as to charging for repairs to mains. In November last, the Committee's attention was drawn to the report (contained as an appendix to the annual report of the Local Government Board for 1897-8) of Mr. Stoneham, in which he mentioned that, in the course of the audit of the accounts of the Company, a question of considerable importance arose as to the allocation of expenditure on works connected with the 42-inch main which was completed in the year 1891, and laid between Hampton and Camberwell, in which some leaks occurred in 1892-3-4, which were set up in the usual way. Subsequently more extensive works were undertaken, the expenditure on which, however, the Auditor passed as a charge against capital; the statement of the Company's officers being that the works were for the purpose of strengthening and improving the main. In the Company's Act of 1897, it was enacted that they should "repair and make good" all mains and pipes laid under any main road in the urban districts of Hampton and Hampton Wick; and having regard to the words "repair and make good," it appeared to the Auditor incumbent on him to require this expenditure to be charged against the accruing revenues of the Company. The Directors objected to this interpretation; but, in the result, Mr. Stoneham refused to certify the account, and

thought it his duty to obtain Counsel's opinion. The point in dispute appeared to the Committee to be one of considerable importance. The question as to how far the Company were entitled to pay out of borrowed capital the cost both of constructing and of repairing a work such as that referred to, was one which they thought closely concerned the public; since, in the event of purchase by a public authority, that authority would probably find itself obliged to take over obligations under a loan very much larger in amount than the real and proper cost of the work which would be transferred to them in return. Under the circumstances, they thought it advisable to address a letter to the Local Government Board, in which they pointed out that, desiring that the question raised should receive the authoritative decision of some tribunal, they had considered whether the Council would be justified in incurring expenditure in proceedings under the Metropolis Water Act, 1897. In reply, the Board forwarded an extract from a letter they had received from the Auditor, in which he reminded the Board that, as pointed out in his report, he entertained great doubt as to the precise force of the words "repair and make good" in section 5 of the Company's Act of 1897. It seemed possible that they might be interpreted as a definition applicable alike to works in Surrey as to those specified in Middlesex; while the Company contended that the words had slipped into the statute in error, and had no particular force or bearing. Further, the Company strenuously maintained the position that the necessary outlay for the whole of the work should be met out of capital; the Auditor, on the contrary, inclining to the view that it was in the nature of repair, and that the outlay should be borne by the accruing revenues. In these circumstances, and before dealing with the matter, the Auditor thought it his duty to obtain Counsel's opinion. The work consisted in fixing a collar over the joint, the two ends being run with lead and the centre filled with concrete. This treatment was applied to 3092 non-leaking and to 662 leaking joints. Having received the advice of Counsel, and after long discussion with the officers of the Company, the Auditor came to the conclusion that the works carried out might be classed as (*a*) those of a preservative kind, being for the strengthening of the main, and in the nature of additional capital outlay consequent on original faulty construction; and (*b*) those of a reparative kind, the outlay for which in ordinary circumstances would be a charge against the revenue. The basis, therefore, on which he settled the allocation of the expenditure as between capital and revenue was to charge one-half the outlay incurred for each leaking joint to revenue, and allow the remaining half as a charge against capital. Upon this basis of calculation, it would appear that sums amounting to £52,564, in respect of non-leaking joints, and £5627 in respect of leaking joints, were charged to capital; leaving the remaining half of the cost of repairing the leaking joints chargeable to revenue. In forwarding the extract above referred to, the Board intimated that, as the Company had agreed to the decision of the Auditor, section 42 of the Act of 1871, which provides for arbitration in the event of a Water Company feeling aggrieved by any act of the Auditor, did not apply, and that the matter was not one in which the Board had any jurisdiction. The Committee consulted the Solicitor to the Council as to whether there were any means of obtaining a decision of a Court of Law on the question; but he expressed the opinion that the Council could not take proceedings, as the case did not come within the meaning of section 2 of the Metropolis Water Act, 1897. The Committee therefore stated that they did not propose to take any further action in the matter, but reported the facts for the information of the Council.

THE COMPARATIVE COST OF GAS AND ELECTRIC LIGHT.

The old controversy respecting the comparative cost of lighting by gas and electricity has been revived at Plymouth. One of the local papers published a few days ago an account of the progress of the electricity undertaking, which is nearing completion. In the course of it, reference was made to the cost of the electric light; and Mr. J. H. Rider, the Electrical Engineer, was reported to have said that a 16-candle power lamp could be kept burning for 16½ hours with the expenditure of one unit of electricity, the cost of which would be 4½d. "This," added the Engineer, "is about equivalent to a cost of 2s. 3d. per 1000 cubic feet for gas." The statement was immediately challenged by Mr. P. S. Hoyte, Assistant-Engineer to the Plymouth Gas Company, who, writing to the same paper, pointed out that Mr. Rider was altogether wrong. A 16-candle power lamp burning for 16½ hours is equivalent to 264 candle-hours; while 1000 cubic feet of 15-candle gas burnt at the rate of 5 cubic feet per hour in an ordinary burner give 3000 candle-hours, or when consumed at the rate of 4 cubic feet per hour in a Welsbach incandescent burner give an average illuminating power of 50 candles, or a total of 12,500 candle-hours. Plymouth gas being sold at 1s. 9d. per 1000 cubic feet, the cost said Mr. Hoyte, works out as follows: Electricity, 264 candle-hours, costs 4½d., or 0·017d. per candle-hour; gas, with an ordinary burner, 3000 candle-hours, costs 1s. 9d., or 0·007d. per candle-hour; gas with a Welsbach burner, 12,500 candle-hours, costs 1s. 9d., or 0·0021d. per candle-hour. Light for light, therefore, the cost of electricity is nearly two-and-a-half times that of Plymouth gas consumed in an ordinary burner, and more than eight times that of the same gas used with a Welsbach burner. Another correspondent dealt with the same subject, but on the assumption that the gas cost 2s. 3d. per 1000 cubic feet. He accordingly arrived at the result that electricity at 4½d. equals gas at 2⅝d., or electricity at 4½d. per unit equals gas at 3s. 8d. per 1000 cubic feet. He went on to point out that with a Welsbach burner, giving a duty of 15 candles per cubic foot, electricity at 4½d. per unit is only equal to gas at about 20s. per 1000 cubic feet; while with a new Welsbach burner, giving a duty of 25 candles, it is equal to gas at 36s. per 1000 cubic feet. The Electrical Engineer has not replied to his critics; and some people in Plymouth will probably continue to entertain, until the bills come in, the delusion that electric lighting is going to be nearly as cheap as gas.

During the past year, no fewer than 1100 gas-meters and 1200 cooking-stoves were fixed in the Barry district by the Gas Committee. The total bad debts of the Gas and Water Department in the same period only amounted to £7 14s. 6d. For the two previous years, there were no bad debts.

THE OPPOSITION TO THE YEADON GAS COMPANY'S BILL.

A Suggested Compromise.

The Solicitors to the Yeadon and Guiseley Gas Company (Messrs. Watson, Son, and Smith) have addressed another letter to the Local Authorities of Yeadon, Rawdon, Guiseley, and Menston, expressing astonishment at not having received a communication from the various Authorities since the previous interview. It certainly looked as if the District Councils were determined to put the ratepayers to the expense of opposing the Bill, without first using every reasonable effort to effect a satisfactory arrangement. They observed that a suggestion was made by one of the members that their letter was not written with the *bonâ-fide* intention of coming to an arrangement; but the Bill had been advertised for many weeks, and no attempt had been made by the District Councils to officially inform the Company that they desired to discuss the matter. As soon as the Company learnt that the Councils objected to the Bill, and apparently did not intend to approach them on the matter, the Solicitors were instructed to approach the Councils. The Company were *bonâ fide* desirous of effecting a friendly settlement. As the previous interview had apparently brought about no results, the Solicitors were instructed to propose another meeting with the Manager of the gas-works, the Consulting Engineer (Mr. Henry Woodall), and themselves, at their offices in Bradford, to make a further attempt at a settlement. If any arrangements were come to, they would be subject to confirmation by the Gas Company and the respective Councils.

At an interview on Thursday, at Bradford, terms of compromise were suggested. The standard price is to be 3s. 3d., and the net price 2s. 9d.; increased dividends to begin to accrue only below the latter price. The electric lighting clauses are to be withdrawn. The deputation promised to advise their respective Councils to accept these terms. They have since done so, but will not yet withdraw their opposition.

ELECTRIC LIGHTING NOTES.

After seven months' consideration, the Electric Lighting Committee of the Hackney Vestry have issued a report prepared by Mr. R. Hammond; and they recommend the Vestry to adopt an electric lighting scheme therein set out, which will cost, exclusive of charges for the site of the works, £242,367.

The Lighting Committee of the Leeds Corporation last Wednesday decided to apply for power to borrow £150,000 to extend the electric light mains in the city, enlarge the present generating station, and acquire additional machinery. This sum, it is expected, will be adequate to meet the more pressing requirements for the next two years.

With reference to the statement lately in circulation regarding the electric lighting of St. Paul's, "The Times" says that Sir William Richmond has been promised the sum of £5000 by Mr. Morgan, the New York banker, to defray the cost of such an installation of electric light in the Cathedral as will serve to light up the mosaic decorations.

The action of the mortgagees of the Kingswood (near Bristol) electricity supply works in cutting off the current owing to a decision of the District Council not to carry out an agreement for the purchase of the works, has decided the latter to enter into a contract with the Gas Company to light the area for a period of not less than ten years. For street lighting, a trial is to be made of the incandescent system.

The Wallsend District Council last Tuesday passed a resolution approving of the Bill which the Walker and Wallsend Gas Company have introduced to empower them, among other things, to provide and distribute electricity. It was also decided to request the Company to satisfy the Council as to the practicability or otherwise of utilizing the refuse of the Wallsend district in the production of electrical energy.

Last Wednesday, Colonel A. G. Durnford, R.E., Local Government Board Inspector, attended at the Town Hall, South Shields, for the purpose of inquiring into the application by the Corporation for powers to borrow £20,000 for electric lighting purposes. The Town Clerk (Mr. J. M. Hayton) explained that the extension of the electric lighting plant had become necessary by reason of the popularity of the light among consumers. A sum of £7000 was for new plant, £5000 for mains, £2000 for buildings, £2000 for connecting up consumers, £1750 for boilers, £750 for steam-pipes, and £300 for a crane.

There are two Electricity Companies in Newcastle-on-Tyne; and we noticed the work of one last week. The Electric Supply Company have since met; and the balance-sheet and position of the business were regarded with satisfaction by the shareholders. In the past year, the output in units was 803,789, against 660,960 in 1897; and the total profit was £6020. This permitted of the payment of a dividend of 4½ per cent.; making 8 per cent. for the year. Out of the balance in hand, £1000 is to be transferred to reserve and depreciation, and £994 carried forward. The capital of the Company has been increased by the issue of 300 new shares; and the money has been expended mainly in the provision of new generating plant, capable of turning out 10,000 volts.

After considerable discussion, the Beckenham Urban District Council—whose area is chiefly supplied by the Crystal Palace District Gas Company—have just adopted a rather novel scheme for the electric lighting of the parish. They have entered into a contract with the British Insulated Wire Company to provide the initial installation for £25,054—the Council erecting the buildings, chimney, and dust-destructors; and for this purpose a loan of £37,000 is to be raised. The Company are to run the station at their own cost for the first five years, supplying electricity at not exceeding 6d. per unit; and they have also undertaken to destroy all the Council's refuse free of charge. Further, the Company during the period named agree to pay to the Council the amount of the sinking fund and interest on the loan; and at the end the Company are to hand over all the plant, as well as the destructors, in perfect condition. The Council will collect the charges for the electric light, and pay the money, less the expense of collection, to the Company; and the latter are to take all risks and liabilities in relation to the work.

Mr. H. H. Law held a Local Government Board inquiry at the Doncaster Guildhall last Tuesday, in connection with an application by the Corporation to borrow £30,000 for the purpose of carrying out works for electric lighting. The Town Clerk (Mr. T. B. Sugden) explained that the undertaking had the full approval of the burgesses, who sent in a memorial that the Corporation should undertake the supply rather than

allow the work to fall into the hands of a public company. The loan was asked for 45 years. Of the total amount (£30,000), £5000 had been estimated as the cost of the buildings. There was a compulsory area to be served; but there would be power to supply beyond it. Mr. Crabtree (the Borough Surveyor) explained the situation and the nature of the buildings, &c.; and Mr. Shoolbred, who has charge of the scheme, the details. He said the working would be on the three-wire system, and that of the full sum required it was estimated that £20,000 would be absorbed by the compulsory area. It was explained that the amount of £30,000 was an estimate, not based on tenders. On the conclusion of the inquiry, the Inspector viewed the site of the works.

Last Friday week the Hastings Town Council adopted the report of the Public Lighting Committee, which stated that the purchase of the undertaking of the Hastings and St. Leonards Electric Light Company had been duly completed, the total sum paid being £62,095, made up as follows: Purchase of undertaking, £54,800; new machinery, alterations to buildings, &c., carried out by the Company since the date of the contract to purchase (July 23, 1897), £6547; the remainder was for sundry purposes. A Sub-Committee, appointed to undertake the management of the Electrical Department, have been settling various details in regard to the working of the undertaking. The Council take over Mr. L. Andrews as Borough Electrical Engineer, and Mr. C. W. Kennaway as Assistant-Engineer; while Professor Kennedy will continue to act as Consulting Engineer. The Council have decided to charge for any amount up to 20 units 13s. 4d.; and 8d. for each unit over 20 units. The Borough Electrical Engineer and Professor Kennedy have reported upon extensions to mains, &c.; and the Council have adopted the recommendation of the Sub-Committee that the whole of the works specified should be carried out, and that application should be made to the Local Government Board for sanction to the borrowing, for a period of at least thirty years, of the sum of £32,768, the total estimated cost of the works. This amount is apportioned as follows: New plant and machinery, &c., £22,184; extension of mains, &c., £10,584.

PROJECTED WATER LEGISLATION.

It will have been seen, from what has appeared from time to time in the "JOURNAL," that water supply, especially in regard to the Metropolis, is likely to occupy a large share of the attention of Parliament this session. As already recorded, Mr. Chaplin has introduced the Government Bill to enable the Metropolitan Water Companies to supply each other; and Mr. Cornwallis, the member for Maidstone, has brought in a Bill to amend the law respecting the supply of water by companies and other bodies and persons. We give below a full abstract of the provisions of these measures.

The Government Bill.

Mr. Chaplin's Bill consists of only six clauses, the first of which defines the duties and powers of the Metropolitan Water Companies with respect to the mutual supply of water. It is to be the duty of the several Companies, and they are to be respectively authorized, if so required by the Local Government Board, to submit schemes for works enabling them to supply each other with water, and to construct such works as may in the opinion of the Board be necessary for the purpose; also, whenever in the opinion of the Board a case of emergency has arisen or is likely to arise, to supply, at a reasonable cost, and to such extent and during such period as the Board may direct, such water as may be required for the need of another Company, and may be available after satisfying the requirements of the district of the supplying Company. For the construction of works required for the purposes of the Act, each of the Companies may exercise outside their district the same powers as they possess within it; and nothing in any Act is to prevent such Company from supplying water to another Company or for another district. The cost of constructing the works contemplated is to be borne by all the Companies in proportion to their respective water-rentals as appearing from time to time from the published accounts for their respective last completed year. If any question arises as to the terms on which water is to be supplied, it is to be settled in accordance with the Arbitration Act, 1889, by an arbitrator agreed upon by the Companies or appointed by the Local Government Board. The Board may make such orders as they may deem necessary fixing the times within which schemes are to be submitted and works are to be constructed; determining the extent to which, and the period during which, a supply is to be given; and prescribing the information to be supplied by the Companies to them for the purposes of the Act. If a Company make default in compliance with an order, they are to be liable, for every day during which such default continues, to a penalty of £100, which may be recovered by the Board as a debt due to the Crown.

The second and third clauses deal with the issue of debenture stock and the contingency of the future purchase of the Companies' undertakings. The former clause sets forth that a Metropolitan Water Company may, with the consent of the Local Government Board, raise any money required to be contributed by them for the purposes of the works needed to give effect to the requirements of the Act by the issue of debenture stock; but the Board are to make it a condition of their consent that the stock shall be raised in accordance with the provisions contained in the most recent Acts for the time being with reference to the issue of debenture stock by a Metropolitan Water Company. It is provided that a company shall not be required to carry to a sinking fund a percentage of the amount of money for the time being raised by the issue of debenture stock created under the powers of the Act. The third clause sets forth that if the undertaking of any of the Companies is purchased otherwise than by agreement, by any public body or trustees, within seven years from the passing of the Act, nothing therein contained is to authorize the Company to bring into account or to make any claim in respect of any advantages conferred on them by the Act, or resulting from the passing of it.

The remaining clauses specify that the Local Government Board may direct an Inspector to hold any inquiry which they may deem necessary for the purposes of the Act; and he is to have all the powers possessed by an Inspector conducting inquiries directed by the Board under the Public Health Act, 1875. All the costs, charges, and expenses incurred by the Board in relation to any scheme submitted or inquiry held under the Act—including the expenses of any witnesses summoned by the Inspector and a sum to be fixed by the Board for the services of the Inspector—are to be paid to the Board by the Companies, or some of them, as the Board may direct, and may be recovered as a debt due to the Crown. The Act may be cited as the Metropolis Water Act, 1899.

Mr. Cornwallis's Bill.

This Bill consists of seventeen clauses; and its main object is to protect sources of water, and ensure purity of supply.

The first clause sets forth that if any water company supply for domestic use impure or unwholesome water, they shall be liable to a penalty not exceeding £50 a day; and the fact that a penalty is imposed by this or any other Act is not to affect the right of action which any person would otherwise have against a company in respect of damage caused to him by the supply of impure or unwholesome water.

Under clause 2, any person authorized in writing by any Sanitary Authority within whose district water is supplied by any company for domestic purposes is to be entitled at any time between the hours of nine in the forenoon and four in the afternoon, on giving not less than six hours' notice in writing, to visit and inspect any lands, works, pipes, reservoirs, or premises of the company, and to take and carry away any samples of water therefrom. These samples are to be taken in triplicate, and be forthwith sealed up and marked by the person taking them, who is to leave one with the supplying company, who are to be entitled to be represented when the samples are taken. It is to be the duty of every sanitary authority to authorize some person to exercise the power conferred.

By clause 3, any water consumer within the district of a Sanitary Authority may request the person authorized as above specified to exercise his powers. The request is to be in writing, and is to state the grounds upon which it is made. If the authorized person neglects or refuses to comply with the request, the consumer may apply to the Local Government Board, who may require the party concerned to show cause for his neglect or refusal, and may, if of opinion that no sufficient cause is shown, order him to comply wholly or partly with the request. Neglect to obey any such order is to render him liable to a penalty not exceeding £5 for every day during which he so neglects, and costs at the discretion of the Board.

Clause 4 gives the Local Government Board power to appoint a competent person to report on the quality of the water supplied by any company, and the means used by them to prevent its pollution. He is to be entitled, after reasonable notice, to enter upon any lands or premises of the company, and take samples of water therefrom, in the presence of one of their officers. If the Board are of opinion that the quality of the water is defective, or that there is undue danger of pollution, and that this defect or danger is due wholly or in part to omission by the company, without sufficient cause, to do anything they may lawfully do, they may order them to exercise their powers.

Under clause 5, every water company shall once a month cause to be made by a competent person an analysis of samples of the water supplied by them. A record of the analysis is to be kept in their offices, and be open to the inspection of any consumer; and a copy sent to every Sanitary Authority within whose district the company supply water, as well as to the Local Government Board. If the company omit to do any of these things, they are to be liable to a penalty not exceeding £10, and for any subsequent offence to a penalty not exceeding £20.

Clause 6 specifies that the company are to effectually filter all water supplied by them for domestic use before it passes into the pipes for distribution, under a penalty not exceeding £100 for failure, but no proceedings are to be taken against them except under the authority of the Local Government Board, who may, on the request of a company, by licence under their seal, relieve them, wholly or in part, from the obligation here imposed; such licence to continue in force for any period not exceeding three years.

According to clause 7, a map of the district of supply, showing the system of distribution, is to be prepared, certified by the Local Government Board, and kept at the company's offices for inspection, under a penalty not exceeding £10 a day for failure.

Under clause 8, it is not to be lawful for any water company to open or use any new source of supply not specially authorized by Parliament without the licence, under seal, of the Local Government Board. If any company apply in writing to the Board for a licence, the Board are, after notice to the company, and to certain Sanitary Authorities, to cause the proposed new source to be inspected; and any Sanitary Authority within whose district the company have power to supply water from the proposed new source are to be entitled to be represented at the inspection. The company are to give notice of their application to every Sanitary Authority concerned; and no application is to be entertained by the Board unless it states that such notices have been given.

The remaining clauses may be briefly summarized. Clause 9 provides for the taking of samples of water by authorized persons; clause 10, for the purchase of land for the protection of sources of water from pollution, and specifies the method to be adopted to acquire it; clause 11 gives the Local Government Board authority to submit to Parliament for confirmation any Provisional Order made by them in pursuance of the Act; clauses 12 and 13 deal with penalties; clause 14 consists of definitions; and clauses 15 to 17 set forth that the Act is to come into force on Jan. 1, 1900; that its operation is to be limited to England only (excluding the Administrative County of London and the area mentioned in section 3 of the Metropolis Water Act, 1847); and that it may be cited as the Water Supply Act, 1899.

Street Gas Explosion.—An explosion occurred last Wednesday afternoon outside the Clarkson Street Elementary Board School, Canning Town. The boys had just been dismissed, and were playing in Fox Street, when one of them noticed an escape of gas from the manhole of a sewer, and, boy-like, conceived the idea of igniting it. The gas burst into flame, and then he dropped a lighted match into the sewer. An explosion immediately followed. The manhole cover was blown off, and a flame shot to a considerable height. Some 20 boys who were standing round the manhole were severely burned about the face and hands, and 17 of them, with the assistance of the police, were taken to the Poplar Hospital, where they were found to have sustained extensive superficial burns.

METROPOLITAN WATER SUPPLY COMMISSION.

Fifty-Third Day—Monday, Feb. 20.

(*Viscount* LLANDAFF, *Chairman*, *Sir* JOHN E. DORINGTON, Bart., M.P., *Sir* G. B. BRUCE, M.Inst.C.E., *Major-General* A. DE COURCY SCOTT, R.E., *Rt. Hon.* J. W. MELLOR, Q.C., M.P., *Mr.* A. DE BOCK PORTER, C.B., *Mr.* H. W. CRIPPS, Q.C., and *Mr.* R. LEWIS.)

The Commission sat at the Guildhall, Westminster.

The following are the Counsel engaged: Mr. POPE, Q.C., and Mr. CLAUDE BAGGALLAY, Q.C., for the New River and the Southwark and Vauxhall Water Companies; Mr. LITTLER, Q.C., and Mr. LEWIS COWARD for the Kent Water Company; Mr. PEMBER, Q.C., for the Lambeth, East London, Grand Junction, and West Middlesex Water Companies; Mr. RICKARDS for the Chelsea Water Company; Lord R. CECIL for the Hertfordshire County Council; Sir JOSEPH LEESE, Q.C., M.P., for the Kent County Council and Kent Local Authorities; Mr. BALFOUR BROWNE, Q.C., and Mr. FREEMAN, Q.C., for the London County Council; Sir R. NICHOLSON for the Middlesex County Council; and Mr. GABRIEL P. GOLDNEY (Remembrancer) for the Corporation of the City of London.

Mr. *F. Tendron*, Chairman of the Grand Junction Water-Works Company, further examined by the CHAIRMAN, handed in statements prepared by the Engineering Director of the Company (Mr. Hunter) giving a description of the engines and other works, showing the average daily supply of water and other details, and enumerating the pumping and other mains; also some financial returns as to the distribution of capital, the amounts of ordinary and debenture stock, the number of officers, &c. As to the needs of the district until the year 1937, witness said, taking the decennial increase of population at the rate of 22·3 per cent. (the return furnished by the Grand Junction Company to the Balfour Commission), with a supply of 35 gallons and a maximum of 42·7 gallons per head, with 100 million gallons daily passing over Teddington Weir, and the whole on the conditions of 1898, the estimated cost would total £1,063,420. He adopted the figure of 100 million gallons over Teddington Weir because Mr. Hunter's evidence before the Royal Commission was in favour of this quantity, and therefore he had made one of his estimates on this basis. Allowing a minimum flow of 100 or 200 million gallons at Teddington Weir only affected the amount of storage to be provided. For the same daily supply of 35 gallons, with a maximum of 42·7 gallons per head, but with a minimum flow at Teddington Weir of 200 million gallons, the estimated cost would be £1,126,900. This was assuming a decennial increase of population of 22·3 per cent., which would make the population in the Grand Junction district in 1937 920,000. If the decennial increase were at the rate of 13 per cent., the figure would be 649,574. On the same basis (that of the population at the higher rate in 1937), but with a daily supply per head of 45 gallons, and a maximum supply per head daily of 54·9 gallons, and a flow of 100 million gallons at Teddington Weir, the cost would be £1,387,620. With a 200 millions minimum flow over Teddington Weir, and the conditions those first named, the cost would be £1,609,800. The real increase of population in the Company's district between 1887 and 1897 was 13 per cent. The population was ascertained by taking the number of houses supplied and multiplying by 6·4, the average number of inhabitants per house. On the basis of 13 per cent. decennial increase of population, with a supply of 45 gallons per head and a maximum of 54·9 gallons per head daily, the total cost to meet the needs of 1937, including one-third cost of the Staines scheme, would be £958,500.

Major-General SCOTT: This estimate assumes that you have a right to abstract 24½ million gallons a day from the Thames without any storage conditions whatever?

Witness: Yes.

On the assumption that the whole supply of the Companies was put under the storage conditions, the same as the Staines reservoirs scheme is now, can you say what the additional expenditure would be?—Well, we are opposed to it; and therefore we have not considered it. Mr. Hunter will prepare you such a statement, if you like. I take it, though I have not worked it out, that the cost per million gallons of the present estimate was £66,437; and the capital employed by the Company at the present time being £1,778,460 for a maximum daily supply of 23,430 gallons, the cost of that per million gallons of daily supply was £75,600.

So that the figure of your present supply, which is not a storage supply, is in excess of the supply of the future, which is a storage supply?—Yes; but you have to bear in mind that we have a certain amount of storage, that we have a very big reservoir for filtered water, and that we have an enormous amount of pumping plant and mains. It is natural, therefore, that the additional supply would not be as costly as the existing one.

My impression is that it ought to be more expensive—that if you have to derive your water from a storage system, which you have to build up, and then to deliver the water at a greater distance and at a greater height probably, the cost ought to be higher per unit of supply than it is at present?—I look upon it that the prime cost—that is to say, of the construction of the reservoirs and the works—may be less (because it is a joint matter, and on a very big scale) than the works for a single Company. Then I think the additional works of distribution, having all your system complete, would be less. The £1,178,000 includes a certain amount for works in progress, but not enough to vitiate the calculation. The Company expect a large increase of revenue in their country district, which might be more or less profitable. They also expect a large increase in the rental of their London district, though for this increase they will have to give extra supplies—a thing which is not generally supposed. The available daily resources of the Company are 24,500,000 gallons from the Thames and 11,666,666 gallons as their share of the Staines reservoirs scheme—total 36,166,666 gallons. With the consent of the Local Government Board, they could get an additional 3,333,334 gallons daily under the Staines scheme, increasing the total to 39,500,000 gallons daily.

That is enough to give nearly 40 gallons per head per day to your estimated population of 920,800?—Yes.

In answer to further questions, witness said he had not calculated what the population would be at Lord Balfour's Commission's figure of increase—viz., 18·2 per cent. decennially. As to the difference in the estimates of future supplies, when before the Balfour Commission and Sir Joseph Pease's Committee, the explanation was that before the Commission the estimate was based on average daily supply, whereas before the Committee it was on the maximum daily supply. The Company wrote off nothing for depreciation, as they kept their works very efficient by annual expenditure out of revenue. Nor did they add anything in their accounts for appreciation, though they bought 70 acres of land at Hampton, and sold a small portion for almost the cost of the whole, owing to improvement in value. As to the advisability of allowing flood water to subside before filtering, witness said it was a question of cost. If there were not sufficient area for subsidence, there would have to be more filtering; and this meant heavy cost. He preferred providing more filter-beds to the cost of storage. The Company had larger filtering area than any of the other Companies. The proceeds of the sale of land were written off capital cost of works. The Company long before 1852 wrote off capital sums from time to time, totalling £159,473, in respect of obsolete works. They did this purely on their own initiative. The Company had not written anything off capital since 1852. They had a number of shares unissued; and this fact had been their salvation, because the capital they could raise without going to Parliament, and consequently without having the sinking fund put upon them. The Company's expenses of management had been attacked; but he could see no connection between the amount of dividend and the salaries paid. The main fluctuations arose through superannuation charges; the Company having always treated their staff liberally in this respect. Witness went on to point out the effect of the quinquennial valuations. The valuation of 1891, as compared with 1886, showed on unaltered premises an increase of £81,013, and a decrease of £72,648—a difference of £8365, which, at the Company's average rate of 5 per cent., meant an increase of revenue of about £400. But against this, they had to set an increase in the rates charged on their works of £2258. The results of the revaluation in 1896 were similar.

Witness was not cross-examined.

Mr. BALFOUR BROWNE then handed in tables as to the increase in population, showing results slightly diminishing the figure of 18·2 per cent., which the Balfour Commission took.

Mr. *Henry Wilkins*, the Secretary of the Lambeth Water Company, examined by the CHAIRMAN, said his Company would be unwilling sellers of their concern. In case purchase were decided on, they would not assent to any one of the arbitration clauses proposed by the London County Council; holding that the arbitration should take place in the ordinary way under the Lands Clauses Act. In this event they would know where they were; but if the arbitration were under some special clause, they did not know what would happen. Such an arbitration might tend to increase the price paid; but the probability was that it would have the opposite effect. Mr. Banbury's suggestions might form the basis of a scheme of purchase; but the details would require a great deal of attention. If purchase were decided on, the Company might come to terms with the County Council; but they would not agree to negotiate on the basis of any of the arbitration clauses already suggested by the County Council. The dividends of the Lambeth Company had tended in an upward direction, with the exception of the years 1895 and 1896. In 1897, the Company paid their maximum dividend; they had since paid ½ per cent. in addition, on account of back-dividends.

The CHAIRMAN: Do you regard your income as likely to increase?

Witness: Certainly.

On what grounds?—First of all the big houses with large grounds are giving place to smaller ones of greater aggregate value. This is happening all over the district except in the strictly rural parts. Then a second point is that, owing to the scattered nature of our district, mains which are only partially productive have been laid out with a view to future water-rental coming in. All the outside fringe of the district has yet to be developed—Esher, Claygate, West and East Molesey, Kingston, Streatham, Tooting, &c. To a small extent (218 houses) the Company are supplying outside their statutory district.

Mr. DE BOCK PORTER: What is the aggregate amount of back-dividends you claim to be able to pay?

Witness: We are quite content with the figure of the London County Council (£924,000), though I make it a little more.

Over this large area that you anticipate will be productive in the future, do you expect to be able to maintain the high rates you charge?—Quite. In fact, we can obtain higher rates in some portions of the district, owing to the difficulties of supplying there. The people in those places would be glad to get the water almost at any price. I hold that the rates of the Company are not oppressive.

Further examined: The parliamentary area of supply in London was 41·25 square miles, in Surrey 55·64 square miles, and in Kent 6·06 square miles. The area actually supplied in London was 24·90 square miles, in Surrey 40·30 square miles, and in Kent 6·06 square miles. The total parliamentary area was 102·95 square miles, of which 71·26 square miles were actually supplied. The reason the Company were not supplying in the remainder of the area, was partly because it had not been developed, and partly because some of it was supplied by other Companies. The increase in the number of supplies of the Company between 1891 and 1896 was 9·56 per cent. in London, 22·7 per cent. in Surrey (including Croydon), and 13·11 per cent. in Kent—an average of 12·53 per cent. The Company still received applications to supply in Croydon; the reason being that owing to the relative positions of the mains of the Company and of the Croydon Corporation, the Company's supply was sometimes the cheaper. In the circle at Croydon in which the Corporation had power, the Company were not only supplying but increasing the number of supplies. The Lambeth Company had 700 supplies in the Croydon area, where they were on an equal footing with the Corporation. They were, however, not actually competing. The Company were not anxious to increase the number of supplies in Croydon. They had entered into no arrangements with the Croydon Corporation at all. They charged the same rates as the Corporation; but there was no security that the Company would not raise them. There was another part of the district in which the Lambeth Company competed with the Southwark and Vauxhall Company; and there the Lambeth Company charged lower rates than elsewhere. But these lower rates were charged in this joint area before the

existence of the Southwark and Vauxhall Company; and they were due to the fact that the supply there was largely by gravitation, and also to the locality being the original district of the Company. Out of 70,000 supplies in London, a reduction was made in the case of 13,000 because the supply was by gravitation. Witness strongly opposed the suggestion to divide the Companies' works among either the Local Authorities or the counties concerned, as being ruinous and practically impossible.

Mr. BAGGALLAY said the London County Council, by a Bill in Parliament, now proposed to divide the concerns of the Companies among all the Local Authorities.

The CHAIRMAN said that seemed like a *reductio ad absurdum*.

Witness (continuing) thought it would be better to leave the making of provision for future wants to the Companies, than to control them in this respect. Control of this kind would mean divided responsibility, which was exceedingly objectionable from the public standpoint. He did not object to power being given to inspect the water in the Company's reservoirs. As to controlling the power of the Companies to pump from wells to the detriment of their neighbours who might also have wells, he held that the Companies should be allowed to retain their present common-law rights. It would be unfair to deal with the Water Companies in this respect and not touch large brewers, mineral water and vinegar manufacturers, and others who might have wells from which they were drawing large quantities of water for the use of people many miles away. The difficulties of altering the law were almost insuperable. The sinking-fund clause witness characterized as atrocious. It would have the effect, in the case of the Lambeth Company, in a few years of retarding the payment of back-dividends; but whether it would stop them altogether, depended on the growth of the Company. It meant not only that the Company were raising debentures without profit, but at an absolute loss to the shareholders. The Company were now spending £200,000 on storage, which would not bring in a penny. On this they would pay interest and sinking fund; yet Parliament, by imposing the sinking-fund clause in its present form, treated the outlay as being quite as productive as the ordinary capital. Regarding the charges of the Company, witness agreed that they were the highest of any Company, except at a few figures of rateable value. He did not feel bound to defend them, because they were part of a parliamentary bargain. Though their charges were higher than those of any other Company, the income per million gallons was only £30·66; there being three other Companies with a higher, and four with a smaller, income. The average of them all was £28·98. The gross income per supply of the Company was £2·47; there being four other Companies who received more, and three who received less, while the average was £2·53. With reference to the cost of pumping per million gallons supplied, the Lambeth Company headed the list with £3·62; the general average of the eight Companies being £2·44. The Lambeth Company were 50 per cent. above the average; and this fact, together with the extra difficulty which it represented in the matter of diversity of level, &c., justified the high rates. In spite of their apparently high rates, the Company worked on a smaller margin of profit than many of the other London Companies. The margin of profit per million gallons of the Company was £18·07 (which placed it fourth on the list); the general average being £16·54. As regarded margin of profit per supply, the Company stood fifth on the list with £1·46; the general average being £1·44. House rents in the Company's district were very low, and were going down; so that in comparing the Company's charges with those of other Companies, they must compare them with the rates on houses, not of similar, but of larger size and value. There was much more to consider in a comparison of this kind than mere scale. A common rate over London would certainly not mean a common burden, owing to the enormous variations in the rents of houses of similar size in different parts. The Company's supplies had been increasing very rapidly of late.

The CHAIRMAN: Have you had any added supplies where the people might equally well have gone to the Southwark and Vauxhall Company?

Witness: Yes.

They preferred you with your 7½ per cent.?—I do not think that question has come in.

Replying to further questions, witness said he was strongly of opinion that rates were ultimately paid by the landlord, because with a house where the rates were low the landlord got a higher rent; while if the rates were high, he had to submit to a reduction. With reference to pipes freezing, their experience showed that the depth at which they were laid had little to do with it; the draught of water through the pipe being the chief factor. This was shown by the fact that in 1895 a 5-inch main froze at a depth of 3 feet, and a 7-inch main at a depth of 3 ft. 4 in.; while hundreds of miles of various sized mains kept open at a less depth.

Fifty-Fourth Day—Tuesday, Feb. 21.

All the Commissioners were present except Sir G. B. Bruce and Mr. Cripps.

Mr. *Wilkins*, further examined by the CHAIRMAN, made a number of corrections of previous statements in evidence regarding the Lambeth Company. Mr. Haward, he said, had overstated the stock of the Company by a sum of £300,000, because he included in the capital sums raised for short periods on terminable debentures and bonds, which were not allotted to or taken up by the shareholders, and would not command any premium. These terminable debentures and bonds had been replaced by debenture stock; but Mr. Haward included in his statement of capital both the terminable and the subsequently raised debentures.

The CHAIRMAN said he understood Mr. Haward to have suggested that the Company had raised capital in an extravagant way; that the shareholders got a large profit out of the premiums; that having pocketed these premiums, they ought to relinquish their claims to back-dividends; and that it was desirable that the Commission should interfere and bring this relinquishment about.

Witness agreed that this was so.

The CHAIRMAN: The County Council suggested it would be an advantageous control to revise the capital accounts in view of the advantages they possess?—That is a proposition which I think it would be impossible to support in equity or law.

In further examination, witness said, with reference to the suggestion of one of the London County Council's witnesses that the early dividend accounts of the Company as passed ought to be revised, as the Auditor did afterwards revise them, by charging revenue with the proper amount of expenditure and thus cutting down the apparent profits of the Company, that though from tables put in by the County Council it appeared that after the institution of the audit in 1871 the sum devoted to dividend decreased and the sum devoted to maintenance increased compared with what they had been before, yet that was due to the development of the Company's district at the time by the erection of small property. This was borne out by the fact that in other Companies' districts development in the opposite direction was followed by reverse results. Witness next took exception to Mr. Gomme's statement that the capital expenditure of the Company had reached £313,178 in 1848. This figure was never brought forward as alleged. The fact was that in 1848, prior to the passing of the Act of that year, the Company's share capital was £143,800, with authorized borrowing powers exercised to the amount of £69,880, and unexercised to the amount of £12,320—making a total of £226,000. The expenditure, however, on capital account was £296,346; leaving an overpayment of £70,346, which had been met by applying profits to capital expenditure instead of to dividends. These figures were before Parliament in 1848; and though the Bill was opposed, no direction was given as to the adjustment of the capital account. Indeed, so far from disallowing any capital expenditure, Parliament expressly continued the unexhausted borrowing powers of £12,320, thereby practically stereotyping the account as presented. In 1854, however, the Company, of their own motion, wrote off £60,000 as the estimated value of works which had become annihilated since 1785; so that only £10,000 was added to capital. Considerable discussion followed as to the precise manner in which the Company had dealt with this £70,000. Witness was unable to give an explanation satisfactory to the Commissioners; and eventually he undertook to furnish further accounts relating to the matter. Then criticizing the evidence of the County Council, witness said no sum had been disallowed by Parliament; the amount written off in 1854 for works which had become fully annihilated completely covered all obsolete works. There was no justification for writing off capital simply because it was over sixty years old; engines, mains, &c., being maintained or replaced out of revenue, and land at Brixton and Streatham, purchased in 1832 and 1834, having materially increased in value.

Mr. BALFOUR BROWNE said his contention with regard to the £70,000 was that this capital should not have been applied to old works, but should, according to the intention of Parliament, have been applied exclusively to the new works specified in the Act authorizing the capital.

Witness (continuing) referred to the statement of Mr. Dickinson, that short supply was constantly occurring in the Company's district. This was not the case. There was a short supply of water in part of the Company's district for a few days at the end of June, 1897, owing to the sudden blocking of the filter-beds with fish spawn. No house, so far as was known, at Balham or elsewhere, was without water for a whole day; and where there was adequate cistern accommodation little, if any, inconvenience was felt. The pressure was reduced owing to the large quantity of water then being drawn off at the street level for road-watering. The blocking commenced one Saturday afternoon, and the full supply was resumed on the following Thursday. Asked to give his views as to purchase, witness said that though the purchase price had no doubt some bearing on the question, the financial result of purchase did not appear to depend so much upon the sum paid for the undertakings as upon the policy subsequently adopted by the purchaser. The saving estimated by Mr. Haward at £50,000 a year might, for instance, be easily converted into a loss by imprudent or inefficient management. A large number of the Company's shares were held by trustees under wills or settlements, who had power to retain existing investments, but who were, in case of realization, limited to trustees' securities yielding a lower rate of interest. In addition to this, in case of purchase, they would suffer by the probable appreciation in the value of the securities which trustees would be compelled to buy, consequent on so much capital being freed. As to the financial result of purchase, there was no reason to doubt that, assuming the prudent methods of management hitherto pursued were continued, a remunerative rate of interest would be earned on the capital sum representing the arbitration value, whether the undertaking remained in the hands of the Company or was transferred to a public authority. The Company had the strongest objection to any departure from settled law and practice in arriving at the price to be paid for their property. It was clear that in putting forward special arbitration clauses the London County Council were desirous of driving a good bargain, and obtaining possession of the property of the Company for less than its full value. The resolution of the Council of Feb. 27, 1894, showed that in the negotiations then contemplated the Companies were to be assumed to be willing to sell, and that various hypothetical elements of depreciation were to be taken into account; while any factors enuring to the advantage of the Companies were to be excluded. Mr. Dickinson had admitted that the object of the Council was to diminish the compensation payable to the vendor. All the modified arbitration clauses put forward in substitution of the original clause in the Transfer Bill of 1895 were more or less speculative; and the Company objected to going into a speculative arbitration, which, while it might inflate the compensation, would be more likely to diminish it. The statutory precedent for special arbitration terms contained in the Housing of the Working Classes Act, 1890, might, perhaps unconsciously, cause the arbitrator to regard the clause as penal, and shape his award accordingly; whereas the Companies had in no way failed in their obligations. Even if the Company were to be deprived of part of the compensation to which they would be entitled under the existing law, it did not follow that purchase would be financially advantageous to the purchaser, because if the administration were on political and not on business lines the cost of management would considerably exceed the present sum, and the profit be proportionately reduced. The Birmingham scheme of purchase would be a good basis for the purchase of the London Companies. If purchase were decided on, and in the Purchase Bill the Lands Clauses Consolidation Act was specified, negotiations between the County Council and the Companies would almost immediately ensue, because the procedure under the Act was well understood, and the difficulties would be reduced to a minimum.

The CHAIRMAN remarked that if Parliament should sanction a clause remotely resembling any of those proposed by the County Council, the Companies would be well advised to at once open negotiations.

Witness: I am not sure about that.

The CHAIRMAN: They very nearly hit it off with Lord Rathmore.

Witness: There is an old expression: "Thank God there's a House of Lords." If the Companies continue in existence, I understand the sinking fund will lapse.

The CHAIRMAN: You do not expect that the results of the sinking fund clause will come back to your shareholders?

Witness replied that he did not know why not. They ought to.

The CHAIRMAN said they had certainly not been imposed for the benefit of the shareholders. He then asked, referring to a letter he had received, if it was true that the Company charged schools three guineas a year for connection with the mains.

Witness replied that it was for a fire supply. The price varied according to the size of the connecting pipe.

The CHAIRMAN: No; for a communication. You do not pledge yourself to give a supply even in case of fire.

Witness: It is not for fixing but for allowing them to take water from the hydrant.

In further examination, witness said the capital expenditure to meet the requirements of the Company till 1937 he put at £2,300,000. The population at that date would be 1,753,000, which he arrived at by taking the population at 670,000 in November, 1897, and calculating on an increase at the decennial rate of 27·18 per cent. He agreed that the future outlay was not in the same ratio as the present expenditure to supply. This was due to the fact that a good deal of expenditure at present unremunerative would become profitable.

By Major-General SCOTT: In calculations as to the future the Company expected to get about 10 million gallons daily from wells, and to double their draft on the Thames.

Cross-examined by Mr. BALFOUR BROWNE: Beyond the full and fair value of their shares, the Company would want a good deal—allowance for re-investment, probable loss by delay in getting an investment, and possible appreciation of stocks by throwing a large number of buyers on the market at one time. He objected to any special arbitration clause. He agreed that in Norwood, where the Company and the Croydon Corporation had joint powers of supplying, the Company did not charge their full parliamentary rates; but this did not mean that competition had brought down their charges. The reduction was due to the fact that the Croydon people complained of the quality of the Lambeth water. The Lambeth Company thought the complaints were due to the rates being above those of the Corporation; and to test the matter they reduced the rates to the level of the Corporation. There had been no complaints since, which showed that the question was one of rates and not of quality. Nor was there competition between the Lambeth and the Southwark and Vauxhall Companies in districts where both had power to supply.

Mr. BALFOUR BROWNE: Suppose an estate is being laid out in the district which is common to both Companies, do you say you would not give me water at the Southwark and Vauxhall rates?

Witness: Only in the old district of the Company. Not in Battersea, for instance. We should in the lower part of Lambeth.

Cross-examination continued: It was not because the Southwark and Vauxhall Company were at their doors that the Lambeth Company charged lower rates. With regard to the sinking fund, it was put to him that the expenditure of the £200,000 of which he had spoken, though it might not be productive directly, was yet necessary to secure the present income. In this way therefore it was productive, and should be chargeable under the fund. Witness declined to accept the proposition.

By Lord R. CECIL: His objection to stopping a Water Company from pumping from wells, when the pumping depleted neighbouring wells, would apply equally to preventing Companies from pumping in cases where the pumping depleted streams and watercourses. The chief part of the question was whether it was fair to take from the Companies rights which they already possessed.

Mr. BAGGALLAY, as the Commission was about to adjourn, referred to a sum of £40,481 which Mr. Gomme had stated was included in the capital account as it now stood of the Southwark and Vauxhall Company, in excess of the amount allowed by Parliament. He went at some length into the matter; asserting, by reference to various Acts, that it was clear Parliament allowed the whole of this sum at previous revisions.

The CHAIRMAN remarked that Counsel had made it clear that the sum was allowed by Parliament; but it was not at all clear why Parliament had allowed it.

The Commission then adjourned.

The fifty-fifth sitting of the Commission was held yesterday at the Guildhall, Westminster, Lord Llandaff presiding. Mr. Pember, in further elucidation of the evidence given by Mr. Wilkins, handed in a statement of the capital account of the Lambeth Water Company as it stood at March, 1854; adding that as to the £84,000 which the Company were supposed to have carried forward improperly, it was all "moonshine." Mr. Balfour Browne then made an application to call the Chairman of the Water Committee of the Croydon Corporation to give his version of what passed between the Lambeth Company and the Corporation. The application was granted. Subsequently evidence was adduced on behalf of the Chelsea Water Company by Mr. F. S. Clayton, the Governor.

Additional Capital for the Falmouth Gas Company.—A meeting of the shareholders of the Falmouth Gas Company was held yesterday week to consider a proposal to increase the capital. Mr. J. Mead, the Chairman, presided, and explained that the Directors had, on the advice of Mr. Corbet Woodall, put in a water-gas plant which cost £5000. They were compelled to take some steps to increase the supply of gas and the reserve; and as the works were in the middle of the town, hemmed in by other buildings, they had adopted this as the least expensive means of extension. Mr. Woodall thought the additional plant would suffice for perhaps 20 or 25 years; and if they could attain this result for £5000, instead of spending £25,000, as would otherwise have been necessary, it was to the interest of the Company that they should do it. It was decided to raise the £5000 by the issue of 6 per cent. preference stock.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 567.

Issue.	Share	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 13	10½	Alliance & Dublin 10 p. c.	22½—23½	..	4 9 4
100,000	10	"	7½	Do. 7 p. c.	16—17	..	4 8 3
300,000	100	Jan. 3	5	Australian 5 p. c. Deb. .	104—106	..	4 14 4
200,000	5	Nov. 11	6	Bombay, Ltd. . . .	6⅞—7¼	+¼	4 2 9
40,000	5	"	6	Do. New, £4 paid .	4¾—5¼	..	4 11 5
880,000	Stk.	Feb. 24	12	Brentford Consolidated	275—280*	+1	4 5 9
240,000	"	"	9	Do. New . . .	210—215*	+2½	4 3 9
50,000	"	"	5	Do. 5 p. c. Pref. .	140—145*	+2½	3 9 0
159,275	"	Dec. 15	4	Do. 4 p. c. Deb. .	128—133	..	3 0 2
220,000	Stk.	Sept. 15	11½	Brighton & Hove Orig. .	267—272	..	4 4 7
226,320	"	"	8½	Do. A. Ord. Stk. .	197—200	..	4 5 0
973,500	Stk.	Feb. 24	5	Bristol, 5 p. c. max. .	125—130*	..	3 16 11
420,000	20	Sept. 29	10	British	48—50	..	4 0 0
50,000	10	Feb. 24	12	Bromley, Ord. 10 p. c. .	25—27*	..	4 8 11
75,000	10	"	9	Do. 7 p. c. . . .	20—22*	+1	4 1 10
500,000	10	Oct. 13	6	Buenos Ayres (New) Ltd.	10—10⅛	+⅛	5 14 3
220,000	Stk.	Dec. 30	4	Do. 4 p. c. Deb. .	100—102	..	3 18 5
150,000	20	July 14	8½	Cagliari, Ltd. . . .	29—30	..	5 10 0
100,000	10	Sept. 29	7	Cape Town & Dis., Ltd.	14—15	..	4 13 4
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	57—59	..	5 1 8
550,000	Stk.	Oct 13	13½	Commercial Old Stock .	312—317	..	4 5 2
200,750	"	"	10½	Do. New do. .	242—247	..	4 5 0
200,750	"	Dec. 15	4½	Do. 4½ p. c. Deb. .	145—150	..	3 0 0
600,000	Stk.	Dec. 15	10	Continental Union, Ltd.	200—205	..	4 17 7
200,000	"	"	7	Do. 7 p. c. Pref. .	187—192	..	3 12 11
51,600	Stk	Aug. 31	14	Croydon A 10 p. c. . .	305—310	..	4 10 4
168,400	"	"	11	Do. B 7 p. c. . .	255—265	..	4 3 0
555,000	Stk.	Feb. 24	5½	Crystal Palace Ord. 5 p. c.	130—135*	+2½	3 17 9
60,000	"	"	5	Do. 5 p. c. Pref. .	140—145*	+½	3 9 0
486,090	10	Jan. 27	11	European, Ltd. . . .	22½—23½	..	4 13 7
354,060	10	"	11	Do. £7 10s. paid .	17—18	..	4 11 9
14,993,075	Stk.	Feb. 10	4 10	Gas-light and Coke	4 p. c. Ord. . .	117—119	+2
					3½ p. c. max. . .	100—102	..
					4 p. c. Con. Pref.	126—128	..
					3 p. c. Con. Deb.	101—103	..
3,799,735	"	"	4	Hongkong & China, Ltd.	14—15	..	5 6 8
3,800,000	Stk.	"	10	Imperial Continental .	225—235	..	4 5 1
376,400	100	Feb. 1	4	Do. 4 p. c. Deb. Red.	98—101	..	3 19 3
473,600	Stk.	Feb. 10	3½	Do. 3½ p. c. Deb. "	102—105	..	3 6 8
75,000	5	Nov. 30	6	Malta & Medn., Ltd. .	5—5½	..	5 9 1
550,000	100	Oct. 1	5	Met. of 5 p. c. Deb.	112—114	..	4 7 9
250,000	100	"	4½	Melbourne 4½ p. c. Deb.	107—109	..	4 2 7
541,920	20	Nov. 11	5	Monte Video, Ltd. . .	15—16	..	6 5 0
617,946	Stk.	Feb. 24	9½	Newc'tle & Gatesh'd Con.	228—233*	+1	3 19 5
264,855	Stk.	Dec. 30	3½	Do. 3½ p. c. Deb. .	107—110	..	3 3 8

Issue.	Share	When ex-Dividend	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
150,000	5	Nov. 30	8	Oriental, Ltd. . . .	7¼—7⅝	..	5 3 3
135,000	5	"	8	Do. New, £4 10s. pd.	6¼—6⅝	..	5 6 8
15,000	5	"	8	Do. do. 1879, £1 pd.	1½—1⅝	..	4 11 5
60,000	5	Sept. 29	7	Ottoman, Ltd. . . .	5—5½	..	6 6 2
500,000	100	Dec. 1	6	People's Gas of Chicago 2nd Mtg. Bon'ds.	102—106	..	5 13 2
848,070	10	Oct. 13	6	River Plate Ord. . . .	10—10½	+½	5 14 3
250,000	Stk.	Dec. 30	4	Do. 4 p. c. Deb. .	101—103	..	3 17 8
250,000	10	Sept. 29	10	San Paulo, Ltd. . . .	16—17	..	5 17 8
135,000	Stk.	Sept. 15	10	Sheffield A.	242—245	..	4 1 8
209,053	"	"	10	Do. B.	242—245	..	4 1 8
447,427	"	"	10	Do. C.	242—245	..	4 1 8
5,600,000	Stk.	Feb. 10	5⅓	South Metrop., 4 p. c. Ord.	144—147	..	3 12 6
1,460,000	"	Jan. 13	3	Tottenham and Edmonton A. B.	— —	..	— —
182,380	10	Dec. 30	5	Tuscan, Ltd.	9½—10½	..	4 15 3
149,900	10	Jan. 3	5	Do. 5 p. c. Deb. Red.	99—101	..	4 19 0
				WATER COMPANIES.			
746,184	Stk.	Dec. 30	11	Chelsea, Ord.	320—325	..	3 7 8
150,000	"	"	5	Do. 5 p. c. Pref. .	168—173	..	2 17 10
160,000	"	"	4½	Do. 4½ p. c. Pref. '75	150—155	..	2 18 1
175,785	"	Sept. 29	4½	Do. 4½ p. c. Deb. .	157—162	..	2 15 7
1,720,560	Stk.	Oct. 13	7	East London, Ord. . .	218—223	..	3 2 9
654,740	"	Dec. 30	4½	Do. 4½ p. c. Deb. .	157—160	..	2 16 3
390,000	"	"	3	Do. 3 p. c. Deb. .	101—103	..	2 18 3
700,000	50	Dec. 15	7½	Grand 10 p. c. max. .	172—175	..	3 5 3
310,000	Stk.	Sept. 29	4	Junction 4 p. c. Deb. .	188—143	..	2 15 11
708,000	Stk.	Feb. 10	14	Kent	360—365	..	3 16 9
160,000	"	"	7	Do. New, 7 p. c. max. .	210—215	..	3 5 1
1,043,800	100	Dec. 30	10½	Lambeth, 10 p. c. max. .	297—302	..	3 9 6
406,200	10)	"	8	Do. 7½ p. c. max. .	280—285	..	3 8 1
350,000	Stk.	Sept. 29	4	Do. 4 p. c. Deb. .	138—143	..	2 15 11
500,000	100	Feb. 11	12½	New River, New Shares	430—435	..	3 3 2
1,000,000	Stk.	Jan. 27	4	Do. 4 p. c. Deb. .	137—142	..	2 16 8
902,300	Stk.	June 29	7½	South-wark Ord. . . .	158—203	−2	3 13 11
126,500	100	"	7½	and 5 p. c. Pref.	190—195	..	3 16 11
489,200	Stk.	"	5	Vauxhall 4 p. c. A Deb.	168—171	..	2 18 6
1,019,585	"	Oct. 13	4	West Middlesex . . .	138—143	..	2 15 11
1,155,066	Stk.	Dec. 15	10	Do. 4½ p. c. Deb. .	300—305	..	3 5 7
200,000	"	"	4½	Do. 4 p. c. Deb. .	159—162	..	2 15 7
200,000	"	Sept. 15	8	Do. 3 p. c. Deb. .	102—105	..	2 17 2

* Ex div.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

I am obliged to submit this week a report by Mr. J. Kincaid, the new Manager of the Falkirk Corporation Gas-Works, which fills me with dismay. The report was laid before the Town Council at a meeting on Monday, and was ordered to be printed and circulated for consideration before being disposed of. In the course thereof, Mr. Kincaid stated that, in reporting on the outstanding defects apparent to him, he had been actuated by the necessity of at once making preparation to ensure a supply of gas next winter. He was, however, bound to say that the plant generally was very much out of order, so that weak and faulty parts could only be discovered and rectified as he became more familiar with the working; also that the stock of tools and appliances was too limited for properly conducting the business. It appears, from the report, that the carbonizing plant consists of one bench of eight ovens of eight retorts in each (64 retorts), erected in 1895 upon Hislop's patent principle; one bench of five ovens of six retorts (30 retorts), also erected in 1895; and one bench of two ovens of six retorts (12 retorts), erected in 1898; giving an aggregate of 106 retorts. Mr. Kincaid realized at a glance that things were at a very low ebb in the retort-house; and he put himself in communication with the patentee with a view to improve matters in the interim. The conclusion arrived at is that the whole of the eight ovens on the regenerative system will require an overhaul this summer. The bench of 30 retorts is in an equally dilapidated state; but the bench of 12 retorts is practically new, having been constructed last summer, and should therefore be in good condition. The coal storage accommodation is much below the requirements of the undertaking, and consists of two small stores, capable of holding about 300 tons, after leaving the required space for breaking and carting. Room is available for storing an additional 300 tons in the open, exposed to the inclemencies of the weather. During the winter months, which should be the most profitable for the concern, the carbonizing department remains in a congested state, and certainly not conducive to economical working. The space for coke and ashes is also too confined. No system of checking the colliery weights has been in existence; and Mr. Kincaid recommends that means should be taken to ascertain exactly the quantity of coal delivered into the works, by the purchase of a weighing-machine. The exhausting plant, while sufficient for present requirements, is greatly out of order, and is unreliable owing to defective governing. This should be put right during the summer season. The scrubbers are much below the requirements of the works, and unable to properly perform the duties required of them. The governors are obsolete and unreliable, and the town's supply is subject to sudden fluctuation owing to the inefficiency of this apparatus. Owing to the complicated condition of the system of distribution, Mr. Kincaid is unable to state definitely his views regarding it at present, although he is already convinced that some improvement must be made to avoid interruption in the supply. He concludes by strongly expressing his opinion that the time is now ripe for considering seriously the question of obtaining more space for gas manufacture in Falkirk. In 1894-5, the quantity of gas manufactured was 66 million cubic feet, and for the year 1898-9 the total output should reach 104 million feet; showing an increase unequalled in Scotland. Were the output to remain stationary, it would be of advantage, as already shown, to obtain more accommodation; but with the increase mentioned and trade prospects bright, all doubts regarding longer delay are removed. Apart from the economic side of the question, he thinks he has demonstrated sufficiently that all the available ground is occupied at present; and it is his belief that, with a rapidly increasing consumption, the Commissioners will be unable, at no distant date, to supply the district with gas, unless immediate steps are taken to obtain adequate accommodation for making it.

Has such a "skeleton in the cupboard" ever been disclosed in connection with any gas-works? Carelessness and neglect are a serious indictment of the management of any works; and the responsibility for such should be put upon the shoulders of whoever was careless or neglectful. A desire has been expressed in a local newspaper for an authoritative statement on the matter. If such be published, there should also be given the minutes of the Works Committee, and all the reports they had submitted to them, with comparisons with the other years since the Corporation acquired the undertakings of the Falkirk Gas Company, just four years ago. These would be necessary to show whether it was the policy of the Committee which led to the works being starved of men or material, or whether, there being no stint of either, the blame lay in the application of them. The truth will possibly lie between the two. Looking back, it seems as if the Corporation were not fully alive to the enormously rapid rate at which their business was growing; and it would necessarily follow that they would not make provision for it. The production of the Manager's reports to the Works Committee would show whether the attention of the Committee had been called to the increasing inadequacy of the works to cope with the gas consumption or not; and whether, if their attention had been called thereto, they took action or not. Until these things are known, it would not be safe for anyone to form an opinion as to who is to blame for letting the gas-works get into such a condition as Mr. Kincaid sets forth they are in.

To those who have not seen the Falkirk Gas-Works, I may say that they are in a very crowded condition, hemmed in upon a sort of triangular piece of land, between a wide street and a canal; and, in addition, they are intersected by a cart road which leads from the street to the canal. They are badly situated, and without room for extension. At the time of the transfer, there was another gas-works in the town, at East Bridge Street, capable of producing more than a quarter of the gas which was then made in the present works. But this station was closed and dismantled by the Corporation, for reasons of economical management; and the present works were considerably extended in the matter of producing capacity. The proposals of Mr. Kincaid point in the direction of having entirely new works, which, considering the rapid growth and superlative prospects of Falkirk, may be the cheapest way out of present difficulties. It is imperative that more space be secured for the carrying on of gas manufacture; and unless entirely new works are to be erected, the Corporation will be in a similar position to what they were in before they broke up the East Bridge Street works.

In connection with the acquisition of the gas supply by the Helensburgh

LATEST DEVELOPMENT
IN
GAS-COOKERS

WRIGHT'S PATENT,
BY WHICH ALL THE
ADVANTAGES OF LOOSE BURNERS
ARE OBTAINED
WITHOUT
ANY OF THE DISADVANTAGES.

NO EXTRA CHARGE IS MADE
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JOHN WRIGHT & CO. LIMITED,
LONDON & BIRMINGHAM.

Police Commissioners, Mr. William Smith, who has all along been the Manager of the works, &c., has indicated to the Gas Commissioners a desire to retire from his post. They will doubtless meet his wishes, and, in view of the fact that he is universally liked in Helensburgh and the surrounding district, deal generously with him. Mr. Smith was for many years Treasurer of the West of Scotland Association.

The Arbroath Gas Corporation having agreed to pay half of the damages which had been arranged, in connection with a recent explosion of gas in Glover Street (the Town Council to pay the other half), the Gas Corporation on Thursday ordered the payment of £85 5s. 3d. as their share.

The Forfar Gas Corporation are once more face to face with the subject of the provision of additional storage for gas. The question is not a new one, for nearly ten years ago it was reported to them that, with a maximum daily output of 170,000 cubic feet of gas, a total storage capacity of 150,000 cubic feet was not sufficient. No change has been made in the storage provision; but since then the gas consumption has gone on increasing, and is now equal to 232,000 cubic feet daily maximum. The Manager (Mr. Forbes Waddell) has consequently asked that a new gasholder be erected, at a cost of between £3000 and £4000. The Gas Committee considered his proposal; but, in view of the fact that the Convener of the Committee was absent on account of sickness, and there was otherwise a small attendance, the Committee reported the matter to the Corporation without a recommendation. The Corporation met on Monday night, and had the matter laid before them. Notice of motion was given for next meeting, to the effect that the erection of a new holder be proceeded with. The subject will then be discussed.

At a special meeting of the Troon Police Commissioners on Monday last, it was reported, in connection with the transfer of the undertaking of the Troon Gas Company to the Corporation, that the claim of the Company was for a payment of £8200; that the Arbitrators had failed to agree; and that the Oversman (Mr. S. Stewart, of Greenock) had made an award of £6019. Mr. Stewart's award is within £400 of the valuation put upon the undertaking by the Arbitrator for the Commissioners.

The Corporations of Airdrie and Coatbridge have this week resolved to oppose the Bill of the Airdrie and Coatbridge Water Company, in which powers are asked to increase the Company's capital by £75,000, and to abandon works on which they have already spent £120,000. The Company have recently raised the domestic water-rate from 1s. to 1s. 4d. per pound; and this seems to be the foundation of the alarm of the Corporations, who think that by curtailing the powers of the Company they may be able to keep down the rate. In Coatbridge there is a strong feeling in favour of municipalizing the water supply. In both Airdrie and Coatbridge, the gas and water supplies are still in the hands of Companies.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Feb.* 25.

Sulphate of Ammonia.—The week opened with an improved tone, and a more active market supervened, resulting in improved values at all ports. The closing quotations are £10 3s. 9d. per ton f.o.b. Hull, £10 5s. f.o.b. Leith, and £10 6s. 3d. f.o.b. Liverpool. The business has been mainly for immediate or early delivery, and consumers have had a fair share of the buying; but towards the close spot prices were readily paid for March delivery. There has also been a fair demand for home consumption. The firmer spot market has improved the forward position; and the London quotation (delivery up to June) has been advanced to £10 2s. 6d. per ton, Beckton terms. Scotch makers maintain a firm attitude; their ideas of value being £10 7s. 6d. for similar delivery.

Nitrate of Soda.—In nitrate there has been a decided improvement at all points, and in all positions. Spot price has been advanced to 8s. per cwt. for ordinary and to 8s. 3d. per cwt. for refined quality. Due cargoes, ordinary quality, are held for about 8s. per cwt.

LONDON, *Feb.* 25.

Tar Products.—A fairly steady market continues. There is a little more inquiry for pitch, probably for stocks to carry the fuel makers through the season when shipping cannot be made. The prospect for fuel is more hopeful; and the consumption of pitch is likely to be greater this year than last, while there is no important increase in the production of pitch itself. There is a good market for creosote, which is somewhat scarce owing to a larger consumption brought about by the greater activity in general trade. Anthracene excites more attention. No doubt its extremely low and unprofitable price, together with the undoubted decrease in production, is attracting those who use it. A firmer tone is certainly noticeable in respect to this article. There is no change in benzols; and though large deliveries are being made on old contracts, new business is decidedly languid, with no immediate prospect of better prices. For naphthas also the demand is slack, with a slight retrogression in value.

Average prices obtaining during the week are: Tar, 12s. 6d. to 18s. 6d. Pitch, east coast, 24s. 9d.; west coast, 22s. 9d. Benzols, 90's, 7½d.; 50's, 8d. Toluol, 1s. Solvent naphtha, 1s. 1d. Heavy naphtha, 1s. 1½d. Crude, 30 per cent., naphtha, 3¾d. Creosote, 3½d. Heavy oils, 55s. Carbolic acid, 60's, 2s. Creosote salts, 40s. Anthracene, "A," 4d.; "B," 3d.

Sulphate of Ammonia.—A welcome change has come over this market during the past few days. Buyers are now anxious for deliveries; and there is a marked advance in prices at all ports. Makers' stocks are light, and production is decreasing. Sellers are asking £10 5s., while buyers will pay £10 2s. 6d to £10 3s. 9d., less 3½ per cent., also in all positions. The continued improvement in the value of nitrate of soda will probably force ammonia to a higher level of prices.

City of St. Petersburg New Water-Works Company, Limited.—The report of this Company for the year ended Dec. 31 (O.S.) states that after providing for interest on the debenture debt, the net profits are £5669. An interim dividend of 5s. per share was paid in September. The Directors now recommend a further dividend of 5s. 6d. per share; £500 to be placed to reserve; and £210 to be carried forward. During the past year, £6200 of "A" debentures were paid off, leaving a balance of £12,500 outstanding.

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SLOT COOKERS.

FOUR SIZES.

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COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—Business continues to move on very steadily in the coal trade of this district, with prices exceedingly strong; the chief question just now being the basis on which quotations are to be made for contracts over the ensuing year, to cover the advance in wages. So far, the only contracts of any moment that are coming forward are for engine classes of fuel; and upon these the basis which appears to be adopted generally is an increase of 2d. per ton on current rates for every 2½ per cent. increase in wages, which would represent an advance of 4d. per ton on deliveries after April, and a further 2d. on deliveries commencing after October next. This arrangement applies chiefly to the West Lancashire districts. The principal collieries in the Manchester district are generally quoting a further advance of 5d. per ton on contracts for engine classes of fuel. As regards general business, there is no specially new feature to notice. Pits continue on full time; and generally all the output is moving away. Prices are firm at about 12s. to 12s. 6d. per ton at the pit for best Wigan Arley, 10s. 6d. to 11s. for Pemberton four-feet and seconds Arley, 9s. 6d. to 10s. for common house coal, 8s. 6d. to 9s. for steam and forge coal, 6s. 3d. to 6s. 9d. for best engine fuel, 5s. 3d. to 5s. 9d. for medium, and 4s. 9d. to 5s. for common sorts. For shipment, prices have remained without really quotable change. Ordinary qualities delivered at Garston Docks are about 9s. 6d. per ton, at the High Level, Liverpool, 10s., and at the Partington tips of the Manchester Ship Canal 10s. to 10s. 6d.

Northern Coal Trade.—There is a very strong tone; and though prices for early delivery are not much different, for forward delivery they are decidedly higher. For best Northumbrian steam coals the demand is very full; and for early delivery 10s. 9d. to 11s. per ton f.o.b. is the general quotation. For forward delivery over the season, the quotation is now from 11s. 6d. to 12s. per ton f.o.b. Steam smalls, in the same way, are quoted from 5s. 3d. to 6s. per ton. In gas coals, there is much interest felt in the settlement of the contracts for the supply of the city of Gothenburg; and though official information is as yet incomplete, it is generally believed that the prices of the accepted tenders will vary from 8s. to 9s. per ton f.o.b., according to the quality of the coal. Gas coke is unaltered; but stocks are now slightly lower.

Scotch Coal Trade.—There is continued activity in the coal business, which is stimulated by the facts that trade is good, stocks of coal are low, and the miners are threatening to give trouble. The districts have been holding an idle day to consider their policy; and at a meeting of the Scottish Federation in Glasgow last Friday, a resolution was adopted urging the men to press the agitation for an advance in wages. In Fifeshire, where an advance of 20 per cent. is asked, masters have intimated their willingness to meet the men's representatives in conference; and the men, to be ready in case the conferences should fail, have lodged their notices to stop work. It is expected that terms will be come to, and that an advance will be given all round. Gas contracts are being looked into, which, to some extent, accounts for a sharp rise, in splint particularly. The prices quoted are: Main 9s. 3d. to 9s. 6d. per ton f.o.b. Glasgow, ell 10s. to 10s. 6d., and splint 10s. 9d. to 11s. The shipments for the week amounted to 150,005 tons—an increase of 1580 tons upon the previous week, and of 28,761 tons upon the corresponding week of last year. For the year to date, the total shipments have amounted to 960,613 tons—an increase of 74,980 tons upon the same period of last year.

The Liverpool Corporation and the Supply of Water Gas.—At the meeting of the Health Committee of the Liverpool Corporation last Thursday, Mr. Shelmerdine called the attention of the Committee to the letter which was sent by the Town Clerk to the Gas Company some time since, asking for information as to the extent and in what localities carburetted water gas was supplied. He thought that now the report of the Royal Commission had been published, the Gas Company ought to reply to the Town Clerk's communication. It was mentioned that, after the last Council meeting, the Town Clerk sent a further letter to the Gas Company enclosing a copy of the resolution on the subject passed by the Council. In this letter, which was now read, the Directors were asked to take steps to acquaint consumers in all cases where carburetted water gas, or water gas mixed with coal gas, was being supplied, and also to ascertain whether the fittings were sound and in proper order. A letter was also received from the Garston District Council suggesting joint action on the part of all Local Authorities in this matter. The Town Clerk was again instructed to ask the Gas Company for a reply to the resolution of Feb. 6.

Fatality at the Leeds Forge.—On the 15th inst., an engine tenter named Booth, aged 56, employed at the Leeds Forge, died suddenly at his residence, at Lower Wortley. An inquiry into the matter was opened on the following Friday, and adjourned to allow of the attendance of the Inspector of Factories; suspicion being aroused that the death might have been caused or accelerated by the inhalation of the water gas in use in that establishment. The inquest was resumed last Wednesday. On the previous occasion, the evidence of Drs. Brown, Halliday, and Mackenzie was that the deceased died from cardiac affection, and that there were no traces of water-gas poisoning. Dr. Halliday, however, who was the medical attendant of deceased, expressed the belief that repeated "gassings" by water gas, from which deceased had suffered, had accelerated death by overworking the heart. Dr. T. Morrison Lake, Medical Inspector of Factories for the Home Office, was now in attendance. He said he had been that morning to the Leeds Forge, and examined carefully the place where the deceased worked. He noticed in one corner of the hut a very strong smell of gas, which he attributed to the absence of ventilation at that particular spot. It was at the end of the engine-room, so that there could be no escape of gas there. He had noticed the smell as a casual visitor; and it seemed to him that it must be persistent, and that there must be a constant slight escape of gas which should be avoided. It was sufficient to prejudicially affect the health of anyone working there; 4 per cent. of the gas constantly inhaled in the course of an hour would produce serious symptoms of carbon monoxide poisoning. The Jury returned a verdict—"That the cause of death was failure of the heart's action, accelerated by water-gas poisoning."

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Compensation for the Stalybridge Explosion.—The Gas Committee of the Stalybridge Corporation have awarded Mrs. Rigby, whose husband was suffocated on the occasion of the recent explosion, £60, to cover all expenses—her claim being £40; and to two other parties who had sustained damage, sums of £3 and £7. A neighbour who rendered assistance to the injured was granted £1 1s.

The Management of the Brighouse Corporation Gas-Works.—The members of the Brighouse Town Council last Wednesday had a long discussion on the proposition of Messrs. Hardaker and Pickersgill to sever the offices of Town Clerk and Gas Engineer, which have been for many years held by Mr. James Parkinson. The proposal was that another Town Clerk should be appointed, and that Mr. Parkinson should devote himself entirely to the supervision of the gas-works. The marked ability with which he has discharged the duties of the dual position has been so generally recognized in the borough, that it is not surprising to learn that only four members voted in favour of the change; and the motion was therefore lost.

The Driffield District Council and Gas-Cookers. — At the last monthly meeting of the Driffield District Council the minutes of the Gas Committee, which were brought up for confirmation by Mr. C. Smith, the Chairman of the Committee, contained a recommendation that no exhibition of gas cookers and stoves should be held this year. He stated as the principal reason for this that the Gas Committee were handicapped because they had to pay out of profits for the cookers purchased, having no capital to work with; and that as another exhibition might possibly result in a large demand by the public for gas cooking-stoves on hire, the Council would not be in a position financially to meet the demand. They had already expended £205 on cookers; and the advance of 9d. per ton on coal would increase this year's expenditure by £100. There was no doubt that the use of cooking-stoves would in the long run be a great advantage, and they were the only means of increasing the consumption of gas at the present time. The minutes were adopted.

Precautions in the Use of Water Gas.—At the inquest on the engine-tenter at the Leeds Forge who recently died as the result of heart-failure, accelerated by water-gas poisoning, as reported in a paragraph which appears elsewhere, Dr. T. Morrison Lake, of the Home Office, submitted a few recommendations in respect of the use of this gas. He said he thought it would be desirable that where such gas was used a notice should be put up in the engine-room stating its deadly nature, describing the symptoms produced by inhalation, and the best means of immediately rendering aid to those who were "gassed." His second recommendation was that there should be free ventilation, either by having the place containing the gas-engine kept quite open or merely covered at the top, or else by means of a fan. In the third place, the workmen employed should be healthy to begin with, and should be examined with a view to seeing they were sound. Fourthly, there should be an inspection, at stated intervals, of the valves and connections, by some responsible person, to see that they were all packed. And, lastly, that compressed oxygen gas in cylinders should be kept on the premises for the restoration of those who were attacked.

Reductions in Price.—The Redhill Gas Company have reduced the price of gas 2d. per 1000 cubic feet. The Farnworth and Kearsley Gas Company have reduced their price as follows: When the ordinary consumption is less than 400,000 cubic feet, 2s. 8d. per 1000 cubic feet net; for public lighting and consumptions over this quantity, 2s. 4d. net. The reduction is 2d. per 1000 cubic feet, and takes effect from the commencement of the year.

The Proposed Water-Main under Kensington Gardens.—A memorial, signed by 77 members of the House of Commons, has been presented to the First Commissioner of Works (Mr. Akers Douglas), requesting him not to sanction a proposed connection of Water Companies' mains by means of a pipe laid under Kensington Gardens; and it has been acknowledged by him. He states in his reply that he was some time since approached by the Grand Junction Water Company to permit a right of way for their mains through Hyde Park and Kensington Gardens, but he decided that the proposal could not be allowed; and the Company were apprised accordingly.

Supposed Gas Poisoning at Crosby.—The following particulars appeared in the "Liverpool Daily Post" last Saturday: A widow, named Mary Parsons, aged 67 years, who carried on the business of a general dealer, at 49 and 51, Liverpool Road, Crosby, retired to bed on Thursday night, at 11.30, apparently in her usual health. A son whose bedroom adjoins that of his mother, went to her apartment at 8.30 the next morning, and opened the door. On entering the room he found her lying unconscious in bed, and moaning fitfully. There was a very strong smell of gas in the room; and the windows were immediately opened. On investigation, it was found that gas was escaping freely from a bracket. The gas was at once turned off, and medical aid summoned. The woman was found to be suffering from gas poisoning; and, despite all efforts to restore respiration, she soon died.

The Leeds Gas Undertaking.—One of the resolutions to be brought forward at the next meeting of the Leeds City Council is that it be an instruction to the City Accountant to apply the profits of the water-works, gas, and tramways undertakings, not already appropriated to a reserve or depreciation account, to the city fund, as provided by the respective Acts of Parliament. Arising indirectly out of this proposal, an important matter came under the consideration of the Gas Committee last Wednesday. The Leeds Corporation Act, 1870, stipulates that all profits from the gas-works shall be paid into the city fund; but an Act passed in 1877 gives the Committee power, with the sanction of the Council, to form a depreciation fund. Accordingly, the Chairman (Alderman Lowden) proposed that his Committee be empowered to form a reserve fund, to be called the gas-works depreciation fund, and that the sum of £10,000 should be paid into it from the existing surplus of £22,000. This was agreed to. A gratifying report as to the successful management of the gas-works was also submitted to the meeting. It was stated that the sales of gas per ton of coal carbonized during the six months ending December last amounted to 425 cubic feet more than in the corresponding period of 1897. During the past half year, there was an increase of £7095 in the gas-rental; while the extra cost of coal was only £154.

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COLCHESTER	300,000	ST. CATHERINES (Remodelled)	250,000
BIRKENHEAD	2,250,000	KINGSTON, PA.	125,000
SWINDON (New Swindon Gas Co.).	120,000	PETERBOROUGH, ONT.	250,000
SALTLEY WORKS, BIRMINGHAM (Second Contract)	2,000,000	WILKESBARRE, PA.	750,000
WINDSOR STREET WORKS, BIRMINGHAM (Second Contract)	2,000,000	ST. CATHERINES (Second Contract)	250,000
HALIFAX	1,000,000	BUFFALO, N.Y.	2,000,000
TORONTO	250,000	WINNIPEG, MAN.	500,000
OTTAWA	250,000	COLCHESTER (Second Contract)	300,000
LINDSAY (Remodelled)	125,000	YORK	750,000
MONTREAL	500,000	ROCHESTER	500,000
TORONTO (2nd Cont.; Remodelled)	2,000,000	KINGSTON, ONT.,	300,000
		CRYSTAL PALACE DISTRICT	2,000,000
		DULUTH, MINN.	300,000
		CATERHAM	150,000

Messrs. Fletcher, Russell, and Co., Limited, open to-day an exhibition of gas-cooking ranges, fires, and other appliances, at St. George's Hall, Ramsgate. Miss Helen Edden will give lectures on cookery each day.

The Directors of the Porthcawl Gas Company have decided to extend their works in accordance with the advice of Mr. S. J. H. Willey, whom they called in. The additions will include new purifiers, new condensers, new scrubber, and additional retorts, with all the necessary connections. The work has been entrusted to Messrs. Willey and Co., of Exeter.

Messrs. Richmond and Co., Limited, have just concluded two very successful exhibitions at Blackpool—one at the Masonic Hall, South Shore, and the other at the Coffee Palace, opposite the Central Station. Miss Richmond was the lecturer in one case, and Miss Stansfield in the other. These exhibitions, being the first of the season, were well attended.

The progress made by the New Conveyor Company, Limited, of Smethwick, of which Mr. Gilbert Little is the Chairman and Managing-Director, in the past eight years is strikingly shown by a diagram prepared by the Company. In 1891 the tonnage of automatic conveyors, elevators, and chain-belts and gearing, for labour-saving purposes, turned out by the Company was 1308; whereas last year it was 8400, 6000, and 4200 tons respectively—the conveyor curve taking a steady upward direction.

Messrs. Jonas Drake and Son, of Ovenden, Halifax, have lately secured contracts for a bench of inclined retorts complete, with coal and coke conveying plant, for the Brighouse Corporation, to make a million cubic feet of gas per day; a smaller installation at the Radcliffe Gas-Works, near Manchester, to make 750,000 cubic feet of gas daily; retort benches complete with the firm's regenerator furnaces, at Herne Bay, Redcar, Blyth, and Barnoldswick, and elevating and conveying machinery for the Woolwich Arsenal, Walker-on-Tyne, and other places.

The Hornsey Gas Company have been recently extending their purifying plant, and Messrs. C. & W. Walker, of Donnington, have just put down a large new purifier and have also received a second order for one of their patent purifying machines for 1¼ million cubic feet per day. The same firm have also just been favoured with orders for five purifiers measuring 40 feet by 22 feet for the Crystal Palace District Gas Company, and six 35 feet by 25 feet for the Northampton Gas Company. They have at present in hand twelve very large purifiers for Birmingham.

Writing to "The Times" on the subject of the lamps in St. James's Park, Mr. J. H. Hiley says: "I notice that in St. James's Park, between Marlborough and Buckingham Gates, the Authorities have recently been engaged in the pleasant occupation of exchanging new lamps for old ones. The old lamps, however, probably because they were placed in a Royal park, had at the top of the ironwork of the structure a Royal crown, which was handsome and effective. The new lamps have in the same position what looks like an inverted onion. There is no artistic merit in an onion. May I plead for the restoration of the crown?"

A writer in a local paper hears that the Yeovil people have somewhat bitten their fingers over the purchase of the gas-works. The Council, it may be remembered, forced the Gas Company to sell; and if they had accepted the terms at first asked, the town would now be a few thousand pounds in pocket. The litigation which supervened, however, has swollen the purchase-money to close on £30,000. This will mean a heavy rate for years. He says "there is one consolation in the reflection that Yeovil is a growing town, and in time, probably, the increased consumption will pay off the principal and interest. But this cannot be looked for just yet. If any moral can be deduced from this transaction, it is certainly that of 'leave well alone.'"

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

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[For Illustrated Advertisement, see Feb. 7, p. 338.]

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J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

FOR SALE—One 10,000 Cubic Feet per hour ANDERSON STEAM ENGINE and EXHAUSTER combined, with additional Appliances and Connections for Pumping Water and other purposes. The whole are in excellent working condition. Price £225.
Apply to ROBERT DARNEY, Gas-Works, FAVERSHAM.

FOR SALE, cheap—
Two PURIFIERS, 8 ft. square by 4 ft. deep.
Two " 5 ft. " 4 ft. "
One " 5 ft. " 3 ft. "
One EXHAUSTER, 20,000 Cubic Feet per hour.
Two " 5000 " " "
Also CONDENSERS, SCRUBBERS, WASHERS, GASHOLDERS and TANKS, VALVES, &c., &c.
Apply to SAML. WHILE AND SON, 60, Queen Victoria Street, LONDON, E.C.

GAS Plant for Sale, cheap to clear—
RETORT IRONWORK, several good Sets.
8i -inch VERTICAL PIPE CONDENSER complete.
Four ANNULAR CONDENSERS, 32 in. by 18 ft.
EXHAUSTERS and ENGINES, several good Sets.
TOWER SCRUBBERS, 5ft. by 20ft., 5ft. by 40ft., & others.
PURIFIERS from 5 ft. square to 12 ft. square.
STATION METERS and GOVERNORS.
GASHOLDERS, 35 ft. by 14 ft. & 50 ft. by 18 ft., perfect.
VALVES of all kinds in Stock.
IRON STORAGE TANKS.
J. FIRTH BLAKELEY & Co., Thornhill, DEWSBURY.

FOR SALE, by Tender, Four Lancashire BOILERS, each 28 feet long, 6 feet diameter, by Messrs. Easton and Amos, Builders' Test 100 lbs. Have had little use. Also a 20-horse power HORIZONTAL ENGINE, TANNER'S STRIKING and ROLLING MACHINES, DISINTEGRATOR, BARK-MILL, BARK-PRESSING MACHINE, THREE-THROW PUMP, CENTRIFUGAL PUMP, 3 ft. 9 in. CIRCULAR SAW on Iron Bench, 8 ft. by 3 ft. 6 in. SHAFTING, &c., by Broadley, of Exeter. All in good condition.
For further Particulars and to inspect, apply to the Engineer, Water-Works Pumping-Station, Havant.
Tenders for all or any portion to be sent to the SECRETARY, Water-Works Company, PORTSMOUTH.

FOR SALE.

THE Directors of the Staines and Egham Gas Company have FOR SALE a 10-inch HORIZONTAL CONDENSER, a LIVESEY WASHER, a GOOD'S WASHER, a CAST-IRON SCRUBBER, 8 ft. by 24 ft.—the whole complete, with 10-inch Connections, Valves, &c. They are capable of dealing with 500,000 cubic feet of Gas in 24 hours. All in good condition, and can be removed at once. The whole to be taken down and carted from the Company's Works by the Purchaser.
Tenders for the whole as they stand to be sent to the under-signed.
THOMAS WEBB,
Manager.

TENDERS FOR GAS-METERS.

TENDERS wanted for the Supply and Repair of GAS-METERS, including their setting-up and exchange, for the lighting of Copenhagen, Denmark.
Particulars as to Conditions can be obtained every week-day from Ten to Four o'clock, through the Koebenhavn Gasvaerkers Ingenieurkontor, Vestre Gasvaerk, Koebenhavn V.
Tenders, by letter, with the words "Tilbud paa Gasmaalere," should be addressed Magistrats-Kontor, 4, Abthell, Lavendelstraede 1, Copenhagen K, till Wednesday, March 15, 1899, Twelve o'clock at noon.
THE MAGISTRATE OF KOPENHAGEN.
Feb. 17, 1699.

BRISTOL WATER-WORKS.

YEO PUMPING-STATION.
EXTENSION OF TIME.

THE Directors of the Bristol Water-Works Company are desirous to receive TENDERS for two Pairs of STEAM COMPOUND ROTATIVE BEAM PUMPING-ENGINES, six LANCASHIRE BOILERS, fitted with MECHANICAL STOKERS, two FUEL ECONOMIZERS, and other MACHINERY and APPARATUS, erected complete at their Yeo Pumping-Station, situate at Blagdon, in the County of Somerset.
Drawings may be inspected, and Specifications and Forms of Tender may be obtained, at the Office of the Clerk of Works, Yeo Reservoir, Blagdon, Somerset, and at the Office of Messrs. T. & C. Hawksley, Civil Engineers, No. 30, Great George Street, Westminster, S.W., on payment of Two Guineas (to be returned if a *bonâ-fide* Tender be made), on and after Saturday, the 18th inst.; and Tenders must be delivered at the Office of the Company on or before Ten o'clock in the forenoon of Saturday, the 25th of March next.
The Company do not pledge themselves to accept the lowest or other Tender.
ALFRED J. ALEXANDER,
Secretary and General Manager.
Bristol, February, 1899.
NOTE.—Uncoloured Photographic Copies of certain of the Drawings may be obtained on application to Messrs. T. & C. Hawksley, on payment of the Photographer's charge therefor.

URBAN DISTRICT COUNCIL OF PADIHAM.

TAR AND AMMONIACAL LIQUOR.

THE Gas Committee of the above Council invite TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR, to be produced at their Gas-Works, during the Year ending March 31, 1900.
Sealed Tenders, addressed to the Chairman, Gas Committee, must be sent to me not later than Tuesday, March 7, 1899, and for Particulars apply to the undersigned.
J. R. SMITH,
Clerk to the District Council.
Padiham, Feb. 23, 1899.

RAMSGATE CORPORATION.
(GAS AND WATER DEPARTMENT.)

TENDERS FOR FIRE-CLAY GOODS.

THE Gas and Water Committee invite TENDERS for about 620 feet of STOURBRIDGE or other approved quality FIRE-CLAY RETORTS, 22 in. by 16 in., about 19,000 FIRE-BRICKS, TILES, and about 12 Tons of CLAY.
Tenders to be sent in on or before Noon on Monday, the 6th of March, 1899, addressed to the Chairman of the Gas and Water Accounts Committee, Hardres Street, Ramsgate, endorsed "Tender for Fire-Clay Goods."
Specification and full Particulars on application to
WILLIAM A. VALON,
Engineer.

COUNTY BOROUGH OF BOLTON.
(GAS DEPARTMENT.)

THE Gas Committee of the above Cor-poration invite TENDERS for the purchase of the TAR to be produced at their Gas-Works during the Year ending the 31st of March, 1900.
Further Particulars, and Form of Tender, may be obtained on application to Mr. William Walch, Office Superintendent, Gas Offices, Bolton.
Sealed Tenders, endorsed "Tender for Tar," and addressed to Alderman Miles, Chairman, should reach the Gas Offices, Bolton, not later than Saturday, the 18th day of March.
R. G. HINNELL,
Town Clerk.
Town Hall, Bolton,
Feb. 25, 1899.

EDINBURGH AND LEITH CORPORATIONS GAS COMMISSIONERS.

TO CHEMICAL PLANT MANUFACTURERS.

THE Commissioners are prepared to receive TENDERS from Manufacturers of Chemical Works Plant for the supply and equipment of PLANT and APPLIANCES for the DISTILLATION OF AMMONIACAL GAS LIQUOR and the PRODUCTION of the various COMPOUNDS OF AMMONIA therefrom.
Full particulars can be obtained upon application to the Chief Engineer and Manager, Mr. W. R. Herring, Gas-Works, Edinburgh.
Tenders to be addressed to the undersigned, and delivered at 25, Waterloo Place, Edinburgh, on or before the 25th day of March, 1899.
The Commissioners do not bind themselves to accept the lowest or any Tender.
JAMES MCG. JACK,
Clerk.
25, Waterloo Place, Edinburgh,
Feb. 11, 1899.

COWES URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

THE Cowes Urban District Council invite TENDERS for the erection of COAL-STORES, comprising Steel and Iron Structure on Concrete Foundations, and covered with Wrought-Iron Roof in two Spans, each of 35 feet.
Plans may be seen at the Office of the Engineer and Surveyor to the Council; and Specifications and Forms of Tender can be obtained on payment of the sum of Five Shillings, which will be returned on receipt of a *bonâ-fide* Tender.
Sealed Tenders, endorsed "Tender for Coal-Stores," are to be delivered to the Secretary, Mr. Wm. Halliday, 40, High Street, Cowes, on or before Monday, the 13th day of March, 1899, not later than Two p.m.
The Council do not bind themselves to accept the lowest or any Tender.
JOHN W. WEBSTER,
Engineer and Surveyor.
Council Offices, Cowes, Isle of Wight,
Feb. 21, 1899.

COUNTY BOROUGH OF BURY.

THE Gas Committee invite Tenders for the following Contracts, namely:—
CONTRACT No. 1—For the Supply, Delivery, and Erection of New ROOFS, PURIFIERS, VALVES, CONNECTIONS, &c., complete.
CONTRACT No. 2—BRICKWORK for Alterations to the present Purifying-House.
Plans may be seen and Specification, Conditions, Schedule of Quantities, and Forms of Tender, obtained on and after March 15 next, on payment of—
Contract No. 1—£3 3s.
Contract No. 2—£1 1s.
(which will be returned upon receipt of *bonâ-fide* Tender), on application to Mr. H. Simmonds, Engineer and Manager, Gas-Works, Elton, Bury.
Tenders will not be considered unless made out on the Forms of Tender prescribed.
Sealed Tenders, endorsed "Contract No. 1" or "Contract No. 2," as the case may be, addressed to the undersigned, must be delivered at the Corporation Offices, Bank Street, Bury, on or before April 5, 1899.
JOHN HASLAM,
Town Clerk.
Corporation Offices,
Bank Street, Bury.

TENDERS FOR GAS COAL.

THE Directors of the Windsor Royal Gaslight Company invite TENDERS for 9500 Tons of High-Class GAS COAL, with option of taking 100 Tons per month in addition, to be delivered free to the Great Western Railway Station at Windsor during the Twelve Months ending the 30th of April, 1900.

Deliveries to be made in such quantities and at such times as may be required by the Company.

Sealed Tenders, endorsed "Tender for Coal," to be sent by post to reach the undersigned by Tuesday morning, the 4th of April. Forms of Tender not supplied.

The Directors do not bind themselves to accept any Tender.

By order,
JOHN HENRY STRANGE,
Secretary.

15, Victoria Street, Windsor,
Berks, Feb. 21, 1899.

WEYMOUTH CONSUMERS' GAS COMPANY.

ISSUE OF £6850 3½ PER CENT. PERPETUAL DEBENTURE STOCK.

NOTICE is Hereby Given, that the Directors of the Weymouth Consumers' Gas Company are prepared to receive TENDERS for £6850 PERPETUAL DEBENTURE STOCK (created under the Provisions of the Weymouth Consumers' Gas Act, 1837), to bear Interest at the rate of 3½ per cent. per annum.

The Stock will be issued free of Registration expenses.

Tenders must be delivered at the Company's Offices, 71, St. Thomas Street, Weymouth, not later than Ten a.m. on Tuesday, the 7th day of March, 1899.

Particulars and Conditions, together with Form of Tender, may be obtained at the said Offices, or will be forwarded upon application.

By order of the Board of Directors,
JAMES LOWE,
Manager and Secretary.

Gas Offices: 71, St. Thomas Street,
Weymouth, Feb. 21, 1899.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
LEA BRIDGE DISTRICT GAS COMPANY.
£6000
FOUR PER CENT. PERPETUAL DEBENTURE STOCK
AND
1200 £10 SHARES.

Or such less number as will produce, including Premium, the sum of £19,333. The Shares rank for a Standard Dividend of 7 per cent., subject to the Sliding-Scale; the last Dividend on similar Shares in the Company having been at the rate of 8 per cent.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, the 14th of March, at Two o'clock, in Lots.

Particulars of the SECRETARY of the Company, 3, Jeffreys Square, ST. MARY AXE, E.C.; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

"A most useful Book of Reference, which no Water-Works Engineer should be without."

Notes on Water Supply

Containing References, Tables, Notes, Memoranda, and Detailed Advertisements in Relation to Water-Works Engineering; also Illustrated Description and Prices of Apparatus, Appliances, Tools, and Material required on a Water-Works.

By J. T. RODDA,

Assoc.M.Inst.C.E., Assoc.M.Inst.Mech.E., Member of the British Association of Water-Works Engineers.

Practical Notes on the Worthington Pumping-Engines—Lifts, Water-Motors, Turbines, Measuring of Water, Rams, Filters, Meters, Meter Testing, &c., Prevention of Waste, Recording-Gauges and Water-Works Records, The Venturi Water-Meter Pressure and Discharge Recorders, Evaporation Rain Gauges, Sand-Washing Apparatus, Coverings for Reservoirs, Wind-Engines for Pumping, Pipes, Mains, Hydrants, and most of the Machinery and Appliances used in Water-Works.

Tables, Formulæ, and Rules giving the approximate relative discharging powers of full smooth pipes from 2 to 50 inches in diameter. Tables relating to the delivery of water in pipes, the loss of head through friction, the pressure of water in pounds per square inch and feet head, weights of pipes and specification therefor, and modern rules and regulations, &c., &c.

PRICE 5s.

LONDON:
WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

IMPORTANT NOTICE.

OXFORD GASLIGHT AND COKE COMPANY.

ISSUE OF NEW CAPITAL.
SALE OF
£10,000
CONSOLIDATED ORDINARY STOCK
(Fully paid up)
IN THE ABOVE UNDERTAKING,

TO be submitted to Public Competition by Mr. E. J. BROOKS, in the Masonic Hall, Alfred Street, High Street, Oxford, on Monday, March 6, 1899, at Three for Four o'clock in the afternoon, in separate Lots of £100 Stock each Lot, by order of the Directors of the Company.

Particulars may be obtained of JOHN HESTER, Esq., Secretary to the Company, St. Aldate's Street; and of the AUCTIONEER, 14 and 15, Magdalen Street, both of OXFORD.

BRISTOL WATER-WORKS COMPANY.

SALE OF ORDINARY STOCK.

MESSRS. ALEXANDER, DANIEL, & CO. will SELL BY AUCTION, at the Bank Auction Mart, Corn Street, Bristol, on Thursday, the 2nd of March, 1899, at Two o'clock in the Afternoon,

£15,000
BRISTOL WATER-WORKS 7 PER CENT. MAXIMUM CONSOLIDATED ORDINARY STOCK,
IN LOTS OF £100.

At the Reserved Price of £151 for every £100 Stock.

The above £15,000 Stock is part of the 7 per cent. Maximum Consolidated Ordinary Stock amounting to £690,000, created under the powers of the Bristol Water-Works Acts, 1888, 1893, and 1895.

The Dividend is subject to proportionate diminution whenever the Maximum Dividend to which each class of Ordinary Shares or Ordinary Stock of the Company is entitled shall not be paid in full, but such diminution may be made up in subsequent Years.

For further Particulars and Conditions of Sale apply to the AUCTIONEERS, Bank Chambers, Corn Street, BRISTOL (and 3, Gracechurch Street, LONDON, E.C.); to FUSSELL AND CO., Solicitors, 36, Corn Street, BRISTOL; or to

ALFRED J. ALEXANDER,
Secretary and General Manager.

Bristol Water-Works Office,
Small Street, Bristol.

WINCHCOMBE GASLIGHT & COKE COMPANY,

FIRMS DESIROUS OF
EXHIBITING
GAS COOKING AND HEATING STOVES, &c.,
ALSO MAKERS OF
GAS-ENGINES, SLOT-METERS, AND FITTINGS,
INCANDESCENT DEVICES, &c.,
are requested to COMMUNICATE AT AN EARLY DATE with the Undersigned.

Gas for Cooking, Heating, and Motive purposes, 3s. 4d. per 1000 cubic feet.

W. H. BURTONSHAW,
Manager and Secretary.

ENRICH YOUR GAS
WITH
CHEAP BENZOL.

AT to-day's Price of Benzol, Illuminating POWER costs less than ONE-THIRD OF A PENNY PER CANDLE.

Apply to SADLER & CO., MIDDLESBROUGH.

JAMES OAKES & CO.

ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

"GAS, AND HOW TO USE IT."

A useful little Brochure, suitable for Distribution among Gas Consumers in the District of any Gas Company, and containing

USEFUL HINTS TO GAS CONSUMERS, A COMPARISON OF INCANDESCENT BURNERS WITH ELECTRIC LIGHT, &c.

BY

J. H. TROUGHTON.

Sample Copies 6d. *each.*

100, £2; 250, £4 10s.; 500, £7 10s.; 1000, £10.

The Pamphlet can be specialized to suit the Price of Gas and other Conditions of supply in any particular District, at a slightly increased Charge.

Prices for larger quantities of the Publisher:
WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

THE Acetylene Illuminating Company, Limited, 63, Queen Victoria Street, London, E.C., GIVE NOTICE that they hold the BRITISH PATENT RIGHTS for the MANUFACTURE OF CALCIUM CARBIDE by means of the electric furnace, that they are bringing an action against the Midland Acetylene (Parent) Syndicate, Limited, to restrain them from so manufacturing that product, and that they intend in the future to bring actions against all infringers of these Patents and all purchasers or users of Carbide of Calcium made in infringement of the same.

NOTICE.

THE Acetylene Illuminating Company, Limited, having published and issued an advertisement or circular claiming that they hold the British Patents for the Manufacture of Calcium Carbide by means of the Electric Furnace, we guarantee to indemnify anyone who buys Carbide from us against any claim by "The Acetylene Illuminating Company, Limited," or anyone else.

READ HOLLIDAY AND SONS, LIMITED, Acetylene Gas Engineers and Carbide of Calcium Manufacturers, HUDDERSFIELD.

NOTICE.

THE Acetylene Illuminating Company, Limited, having published and issued an advertisement or circular claiming that they hold the British Patents for the Manufacture of Calcium Carbide by means of the Electric Furnace, we guarantee to indemnify anyone who buys Carbide from us against any claim by "The Acetylene Illuminating Company, Limited," or anyone else.

TINKER AND HOLLIDAY, LIMITED, Carbide of Calcium Manufacturers, HAZELHEAD, SHEFFIELD.

TUBES AND FITTINGS
ALL KINDS
WRITE FOR PRICES
STAFFORDSHIRE TUBE Co., BIRMINGHAM.

BOLDON GAS COALS.

ANALYSIS.

Yield of Gas per Ton. .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

For Prices, &c., apply to
W. H. PARKINSON,
THE HARTON COAL CO., LTD.,
NEWCASTLE-ON-TYNE.

Telegraphic Address: "PARKINSON, NEWCASTLE."

HEBBURN MAIN GAS COALS.

Yield of Gas per Ton . . 10,500 Cubic Feet.
Illuminating Power . . . 16·4 Candles.
Coke . . . . . 68 per Cent.

For Prices, f.o.b. Ship or Delivered by Rail, apply to

The Wallsend & Hebburn Coal Company, Ltd.

B Lombard Street,
NEWCASTLE-ON-TYNE.

W. RICHARDSON, Fitter.

BENZOL.

SPECIALLY prepared for Enriching Gas and PREVENTING THE STOPPAGE OF SERVICE-PIPES by the deposit of Naphthalene. Price 10d. per Gallon, free on rails at our Works in Drums (returnable).

Apply WHITWOOD CHEMICAL CO., Ltd., WHITWOOD COLLIERIES, Nr. NORMANTON.

INCANDESCENT GAS LIGHTING

Has now gained a complete and final **Victory** over its last and greatest Enemy

VIBRATION,

BY MEANS OF

CLAY'S PATENT SHOCK-PROOF Incandescent Burner Fittings

Of which full Particulars may be had from

CLAY & WALMSLEY,

BOLTON, ENGLAND.

Telegrams: "CLAYS, BOLTON."

See "JOURNAL OF GAS LIGHTING," Dec. 13, 1898, p. 1358, and Jan. 17, 1899, p. 130.

London Representatives: H. Greene & Sons, Ltd., 19, Farringdon Road.

HOLMSIDE GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . . 11,205 Cubic Feet.
Illuminating Power $16\frac{7}{10}$ Stand. Sperm. Candl.
Coke (of good & pure quality) $13\frac{3}{4}$ Cwt. per Ton.
Sulphur . . . . . A little over 1 per Cent.
Ash . . . . . Under 1 per Cent.
Tar . . . . . 163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor 103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR PELTON GAS COALS.

Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,
HOLMSIDE & SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

EVESON FOR CANNEL

TELEGRAMS: "EVESON, BIRMINGHAM."

INCANDESCENT GAS LIGHTING.

Incandescent Burners from **5/6 per doz.**

Specially annealed best Fireproof Glass Chimneys (equal to the Jena). 1/4 per Doz.

All other Incandescent Fittings at greatly reduced Prices.

Patentees of the "IMPROVED STANDARD GLOBE-CHIMNEY."

Best "Comet" Bulbs, 2/6 per Dozen. Write for Illustrated Price Lists.

WHOLESALE FITTINGS COMPANY,
80, COMMERCIAL ROAD, LONDON, E.

THOMAS TURTON AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY FOR ENGINEERS.

STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.

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THE NEW

"ST. ALBAN'S" STREET LANTERN.

Specially adapted for Incandescent Street Lighting. Fitted with Steel Enamelled White Reflector.

H. GREENE & SONS, Ld.,
Late of Cannon Street,
19, FARRINGDON RD., E.C.
Telegrams: "LUMINOSITY, LONDON."

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON & COAL CO., LD.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by

Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton . . 10,500 Cub. Ft.
Illuminating Power . . . 16·9 Candles.
Coke (of good quality) . . 67·5 per Cent.
Sulphur . . . . . 0·58 ,,
Ash . . . . . 2·73 ,,

For Price, &c., apply to the

WEARDALE IRON & COAL CO., LD.

QUAYSIDE, NEWCASTLE-ON-TYNE.

WELDON MUD FOR GAS PURIFICATION,

For use in the

RECOVERY OF SULPHUR,

ALSO

Removal of last Traces of SULPHURETTED HYDROGEN in catch position.

Full Particulars on application to the Patentees:

GAS DESULPHURIZATION CO.,

— LIMITED, —

1, FENCHURCH AVENUE, LONDON, E.C.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE BOGHEAD CANNEL.

Yield of Gas per ton . . . . . 13,155 cub. ft.
Illuminating Power . . . . . 38·22 candles.
Coke per ton . . . . . 1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 17·8 candles.
Coke . . . . . 70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE & SONS,
COAL OWNERS, NEWCASTLE-ON-TYNE;
OR
E. FOSTER & CO.,
21, JOHN STREET, ADELPHI, LONDON, W.C.

TROTTER, HAINES, & CORBETT,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAY.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: R. CULL, 84, OLD BROAD STREET, E.C.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

MANUFACTURERS: MAJOR & CO., Ltd. HULL AND WOLVERHAMPTON.
BENZOL FOR ENRICHING GAS

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.
Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.
Telegrams: "DARWINIAN, MANCHESTER." Telephone 1806.

LONDONDERRY GAS COALS
FROM THE
MARQUIS OF LONDONDERRY'S COLLIERIES,
COUNTY OF DURHAM.
Available Output up to 5000 Tons per day.
Yield of Gas 11,000 cubic feet per Ton of Coal as per Analysis by
Mr. John Pattinson, F.C.S., F.I.S.
FOR PRICES AND PARTICULARS, APPLY TO
S. J. DITCHFIELD,
SEAHAM HARBOUR, COUNTY OF DURHAM.

G. & J. HAIGH,
Raven's Lodge Fire-Brick Works, DEWSBURY.
Manufacturers of MACHINE-MADE RETORTS and
FIRE-BRICKS of the highest Quality, made from Fire-Clay of a most Superior and Refractory Character, suitable for **GLASS-WORKS, GAS-WORKS, and BLAST-FURNACES.**
For Prices and Analysis, apply as above.

THE WIGAN COAL & IRON CO., LIMTD.,
Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.
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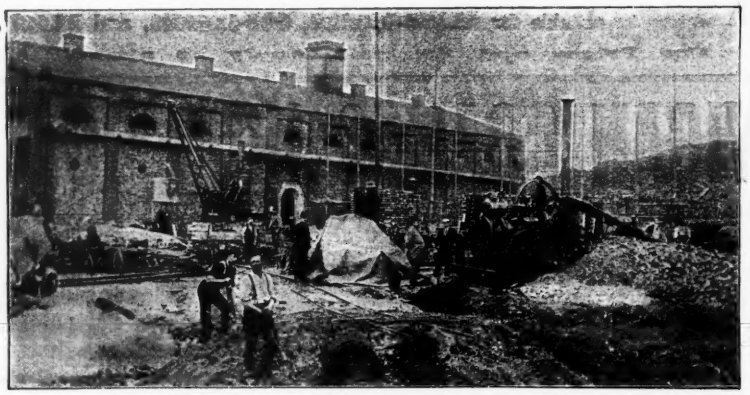

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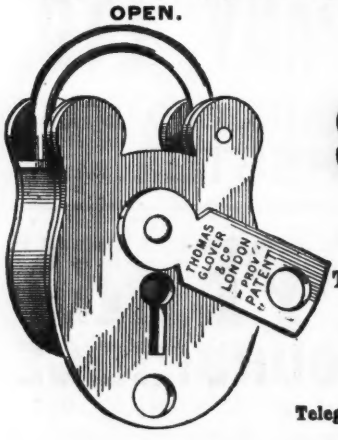

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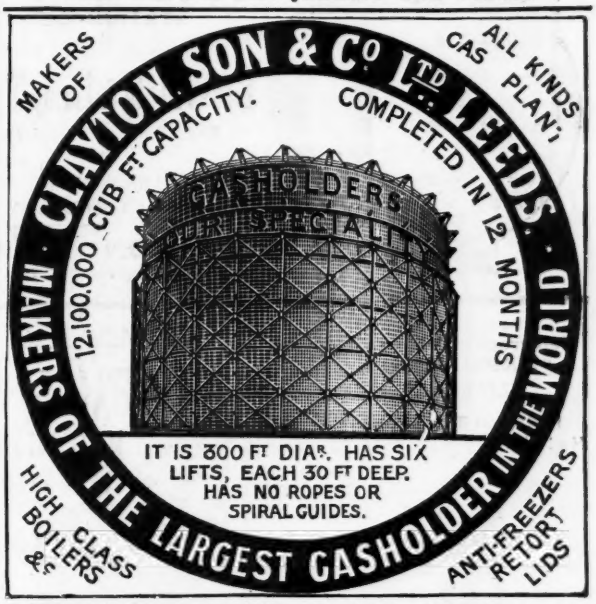
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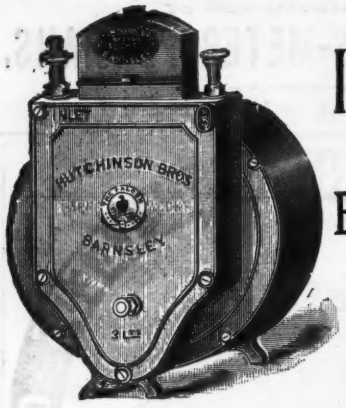

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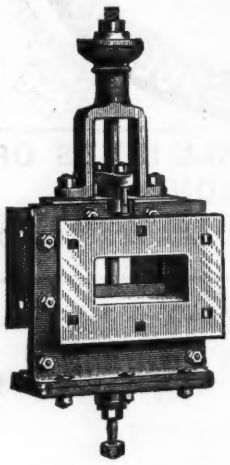

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